

PREDICTING ACADEMIC SUCCESS OF FIRST-TIME COLLEGE-BOUND
AFRICAN AMERICAN STUDENTS AT A PREDOMINANTLY WHITE FOUR-
YEAR PUBLIC INSTITUTION: A PREADMISSION MODEL

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The purpose of this study is to develop a preadmission predictive model of student success for prospective first-time African American college applicants at a predominately White four-year public institution within the Pennsylvania State System of Higher Education. This model will use two types of variables. They are (a) cognitive variables (i.e., SAT score, ACT score, high school GPA, high school rank, advance placement/college credit and ranking of high school), (b) non-cognitive variables (i.e., gender, race, family structure, parental income, and parental education). The cognitive and non-cognitive variables are used with African American and White college-bound students as a way of predicting their persistence and graduation at a four-year PWCU within the PASSHE.

A multiple regression analysis with standardized regression coefficients was used to determine the relative contribution of each predictor variable for predicting the first and second year persistence and graduation status after the fourth, fifth and sixth or more years. A regression analysis was used to analyze graduation after the fourth, fifth, and sixth years and graduation in more than six years, by systematically adding and eliminating both cognitive and non-cognitive predictor variables. This was completed separately for the African American sample group and the White sample group.

The results of the multiple regression analysis supported the two main hypotheses that a significant relationship exists between pre-collegiate data and college success for both races and that a significant difference exists between African American and White students in terms of the model predictors. A different mix of non-cognitive and cognitive variables proved to be strong predictors of academic success for African American and White students.

The findings presented in this study will assist EU and other institutions with recruiting and retaining African American students. Further, the findings should contribute to the understanding of the predictors of academic success that were present over this ten-year period at EU and will continue to be predictors of student success for both African American and White students.

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CHAPTER I: THE PROBLEM

Chapter Introduction

In comparison to other colleges and universities across our nation, Historically Black Colleges and Universities (HBCUs) have a unique educational history. HBCUs are institutions founded prior to 1964 for the purpose of providing collegiate education to African Americans (Brown, II & Davis, 2001).

During the 1950's, over 50% of African American students enrolled in post-secondary institutions attended HBCUs. By 1954, with the Supreme Court decision in Brown vs. Board of Education, such racial segregation in public education was declared illegal (Fleming, 1984). The practice of recruiting students of color by Predominately White Colleges or Universities (PWCUs) is largely a response to this landmark decision and the federal legislation and education policies of the Civil Rights Era.

Justiz, Wilson, & Björk (1994) identified the passage of the first GI Bill for educational benefits in 1945 following World War II as one catalyst leading to social change for persons of color to gain access to higher education. The Korean War and the Vietnam War GI Bills followed. Collectively, these GI Bills enabled hundreds of thousands of veterans, including thousands of African Americans and other persons of color, access to higher education.

The second landmark piece of legislation in the United States which facilitated access to higher education for African Americans and other persons of color began with the 1964 Civil Rights Act, which built on the foundations of President Lyndon B. Johnson's Great Society legislative agenda and included programs that came out of the Office of Economic Opportunity. All of the programs that are familiar to our campuses

today to help disadvantaged students enter into, and graduate from, postsecondary programs (i.e. Upward Bound, Talent Search and Student Support Services) are now referred to as Federal TRIO Programs (Justiz, Wilson, & Björk, 1994).

Today, five decades later, many colleges and universities across the nation have intensified their efforts to recruit students of color. These institutions have used a variety of innovative recruitment strategies that are now popular with a majority of colleges and universities nationwide. These recruitment strategies have included (a) pipeline strategies, (b) outreach programs, (c) marketing approaches, and (d) financial aid incentives.

Pipeline strategies involve encouraging students of color to begin to plan for postsecondary education while the student is at the elementary and secondary levels (Dumas-Hines, Cochran, & Williams, 2001). Outreach programs provide high school students with the opportunity of early campus experiences, such as visiting and touring a college or university campus, attending class with college students and staying overnight on campus in the residence halls (Duman-Hines, Cochran, & Williams, 2001).

Successful marketing strategies to increase the enrollment of students of color have employed pamphlets, brochures, videos, CD's and other publications illustrating diversity on their campuses. Through the use of these marketing strategies, these institutions have increased their enrollment of students of color in a relatively short period of time (Dumas- Hines, Cochran, & Williams, 2001).

Lastly, financial aid incentives such as scholarships, state and federal grants, other grant aid and work-study programs, are often used to reduce financial barriers that may prevent students from matriculating to college.

It is, however, one thing to recruit students of color and another to retain these students at institutions. Although many institutions can boast of their success in recruiting students of color, relatively few can say the same for their ability to retain these same students. Findings indicate that African American students were more likely to drop out of college than their non-minority counterparts (Porter, 1990). Swail, Redd & Perna, (2003) reported that only 46% of African Americans who first enrolled in a four-year institution in 1995-1996 with a goal of completing a bachelor's degree actually completed a bachelor's degree within six years, compared to 67% of White students.

This dilemma unfortunately holds true for retaining African American students at our 105 HBCUs. While the graduation rates of African American students at our nation's HBCUs tend to be much lower than the graduation rates for African American students at our nation's PWCUs, the graduation rate at a number of HBCUs is well above the average for African American nationwide and at least twenty-one HBCUs have seen an improvement in their graduation rates between 1998 and 2005 (Anonymous, 2007). More concerning is that graduation rate statistics have shown that for a significant number of our nation's HBCUs, two thirds or more of all entering African American students do not go on to earn a degree (Anonymous, 2007).

Sissoko & Shiau (2005) have identified several reasons for the low graduation rates at these institutions. Many of the students enrolled at these institutions are from low-income families, where neither parent nor legal guardian pursued a college degree. Additionally, HBCUs typically have lower tuition rates and flexible admissions policies allowing many African American students the opportunity for a college education, which would have otherwise been out of reach. Probably the most important explanation for the

high dropout rate at these institutions is the fact that a large number of African American HBCU students come to college lacking strong academic preparation and study skills.

Many institutions admit that until recently, retention has not been their main focus because they have been more concerned with getting students of color enrolled at their institutions. Now, how to retain and graduate students is one of the major issues with which higher education institutions are faced. Dr. Johnetta Brazzell-Cross, (2000) emphasized this point when she said “Retention is the life blood of an institution, it says a lot about the quality of experiences for the student. It’s something a university has to be responsive to” (p. 17).

Both African American and White scholars have addressed the plight of African American college students attending PWCUs (Astin, 1982; Fleming 1984; Tinto 1993; Loo & Rolison 1986). Retention scholars have known for a long time that a student’s fit or niche in the college environment has a direct impact on retention and graduation. For African Americans, however, this hunt for the perfect fit or niche at their institution of choice is often affected adversely by the challenges faced while making the transition to a PWCU. To combat these challenges, institutions are now beginning to use non-cognitive variables such as (a) socio-economic backgrounds, (b) alumni parents, (c) athletic ability, and (d) involvement in high school, community and civic engagement activities to investigate retention issues (Kuh, Kinzie, Buckley, Bridges, & Hayek, 2006).

Tinto (1987) also identified some of the possible causes for student attrition, which colleges and universities should be focusing on for not only White students but also students of color. Specifically citing academic and social integration as reasons that influence students’ decisions to persist in college or drop out, he found that students

arrive on campus with various built-in characteristics which play a significant role in their persistence or attrition. These characteristics which are both cognitive and non-cognitive in nature are influenced by (a) family backgrounds, (b) high school educational achievement, (c) academic abilities, and (d) other personal attributes such as achievement expectations and goals.

Administrators and researchers in higher education have seen all too often the wide-eyes of optimism and enthusiasm that students bring to registration dissipate when they are not able to register for those courses they would like, or even need, to take. Many times, this results in the student's departure from the institution prior to the completion of a degree. This, researchers believe, is even more valid for African Americans attending a PWCU, and may even be one of the factors resulting in the disparity between African American and White student degree attainment discussed by Swail et al., (2003). Additionally, for most African American students a bachelor's degree requires considerably more time for completion. Astin, Tsui, & Avalos (1996) reported that in 1996 the degree completion rate for all students within four years was only 40% for all four year institutions, and this rate increased to 45% in six years.

More than a decade later, degree completion rates nationally continue to be discouraging and in some instances are worse than those reported by Astin et al., (1996). As outlined in Table 1 (shown below), The Consortium for Student Retention Data Exchange (CSRDE) (2003-2004) reported that the degree completion rate in four years is only 22.5% for Public Master's I & II Institutions, while the six year completion rate increased to 47.8%. While the four year degree completion rate for all four year institutions, as reported by Astin et al., (1996), fared better than the Public Master's I &

II Institutions of today, the six year degree completion data compared only slightly better than those reported over a decade ago. Obviously, such high rates of attrition have a significant fiscal impact on colleges and universities.

These degree completion rates are discouraging for students in general but are even more disheartening when you consider African American students in particular. Astin et al., (1996) found that only 19% of African American students complete a bachelor’s degree within four years, and less than one third (32%) of this group complete a bachelor’s degree within six years. The completion rate for White students is considerably higher at 43% in four years and 47% within six and nine years respectively. The CSRDE (2003-2004) reported that only 13.1% of African American students at Public Master’s I & II Institutions completed the bachelor’s degree within four years, and this rate increases to 33.4% in six years. The completion rate for White students is considerably higher than the African American students at 22.5% in four years and 47.8% within six years.

Table 1
Comparison of Graduation Rates for 1996

Race	All 4 year Institutions – 1996		All Public Master I & II - 1996	
	4 Year (%)	6 Year (%)	4 Year (%)	6 Year (%)
All	40.0	45.0	22.3	47.7
African American	19.0	32.0	13.1	33.4
White	43.0	47.0	22.5	47.8

Source: Astin et al., (1996), CSRDE (2003-2004), Office of Institutional Research (2008). Facts book, Millersville University

These findings regarding degree completion rates among African American students are particularly alarming when you consider that Astin's and others' data include HBCUs. Nettle & Perna (1997) report that approximately 73% of African American postsecondary students are enrolled at PWCUs, and these students have among the lowest completion rates across PWCUs.

In an attempt to recruit students who will more likely be retained and graduate from institutions of higher learning, colleges and universities across the nation have established criteria for the selection of students for admission. While the selection criteria used by institutions may vary, most use some combination of predictive factors that are both cognitive and non-cognitive in nature. Such criteria may include (a) socio-economic backgrounds (low to high income scale), (b) alumni parents (no college to degreed scale), (c) athletic ability (non-participation to varsity participation scale), (d) high school and community activities (non-involvement to high involvement scale), (e) individual aptitude, (i.e., high school grade point average [GPA – 0 to 4.0 scale], high school class rank [first quintile to fifth quintile], Scholastic Aptitude Test [SAT- three subject areas and three scores, each on a scale of 200 to 800] or the American College Testing Assessment test [ACT – four subject areas with a score of 1 – 36] and, (f) self-concept or self-esteem (sum of student's self-ratings of overall academic ability, drive to achieve, mathematical ability and self-confidence). Although these admission criteria have evolved over time, the question remains as to whether or not these criteria are valid in predicting academic performance and retention of students, and more specifically, if these criteria are valid for African American students attending PWCUs.

Problem Statement

Over the past decade, colleges and universities have been asked to demonstrate that they deliver a measurable, empirical product or outcome. Blose (1999) reported that at the federal level, the student-right-to-know legislation is probably one of the more obvious examples of required demonstrated performance by institutions. However, in many states, the greatest impact in the public sector has come from state governments mandating performance indicator programs to justify their investments in higher education. In many instances, these types of assessment initiatives have resulted in a direct connection between the performance of colleges and universities and the funding they receive. The concept of performance-based funding has gained widespread support, and has become ever more popular with state legislators, governors and accrediting associations as a means of rewarding agencies and institutions for good practice and punishing those for inefficiencies and waste.

Most individuals recognize a legitimate need for accountability and realize that the fiscal and societal pressures to improve educational performance are likely to continue in the future. In order to meet these higher standards, many colleges and universities have implemented performance indicator programs that not only measure how effectively institutions are achieving their mission and goals, but at the same time, also assess current practices that may appear insufficient.

When evaluating institutional performance, some facets of the higher education process lend themselves more easily to this practice than others. One of the more common variables and most pressing problems in higher education is the retention and graduation of students. With the threat of under-enrollment and an increase in attrition at

our colleges and universities, student retention has become a priority for administrators on most campuses. A number of factors have been shown to affect student retention, such as (a) academic performance, (b) interactions with faculty members, (c) residence on campus, and (d) working while in school (Pascarella & Terenzini, 1991, 2005). Financial factors such as (a) tuition, (b) housing, and (c) financial aid have also been shown to be important factors in the retention of students (Wells, 2008). Of particular concern for the purpose of this study is the attrition rate of African American students attending PWCUs over the past several decades (Jones, 2001; Padilla, 1999).

In response to new levels of accountability, the commonwealth of Pennsylvania, like other states, has implemented performance-based funding within the Pennsylvania State System of Higher Education (PASSHE). During 2008-2009, 6% of funding, or \$30 million, was held in reserve for performance funding from the State appropriation fund for the PASSHE (Office of Institutional Research, Millersville University of Pennsylvania 2008).

As with the trends across the country, one of the most pressing problems within PASSHE is the retention and graduation of students, specifically African American and other students of color. As displayed in Table 2 below, when looking at the 1st year persistence rates for first-time freshmen at individual universities within PASSHE in 1999, a disparity exists between African American and White students. That year, the PASSHE overall 1st year persistence rate was 65.6% for African American students and 75.1% for White students, a disparity of almost 10%. When broken down by university, the disparity was as much as 20.6%. It should be noted that although the majority of the reported persistence rates are higher for White students than African American students,

there were three universities that reported higher 1st year persistence rates for African American students than White students.

Also in Table 2 below, when looking at the 2nd year persistence rates for the 1999 cohorts at individual universities within PASSHE, a disparity still exists between African American and White students. That year, the PASSHE overall 2nd year persistence rate was 52.5% for African American students and 64.3% for White students, a disparity of 11.8%. When broken down by university, the disparity was as much as 25.1%. Again, it should be noted that although the majority of the reported persistence rates are higher for White students than African American students, there were two universities that reported higher 2nd year persistence rates for African American students than White students.

Table 2
PASSHE Comparison of 1st & 2nd Year Persistence Rates for 1999

University #	1 st Year Persistence (%)			2 nd Year Persistence (%)		
	All	African American	White	All	African American	White
1	71.3	59.9	72.7	61.6	48.8	63.1
2	81.9	77.4	82.1	71.3	47.2	72.3
3	70.1	64.1	70.4	57.5	53.8	57.6
4	57.6	57.6	N/A	45.1	45.1	N/A
5	69.9	73.9	69.6	59.9	62.3	59.7
6	72.1	58.3	73.0	58.4	33.3	60.0
7	71.5	52.3	72.9	59.5	43.0	60.8
8	73.2	79.1	73.0	60.5	53.5	60.7
9	72.5	60.9	72.8	63.1	47.8	63.6
10	67.4	52.0	68.1	57.7	44.0	58.3
11	80.8	74.2	81.3	69.6	65.6	70.0
12	79.2	65.4	79.7	69.5	53.8	70.1
13	71.9	71.2	71.9	60.7	48.1	61.2
14	82.6	84.7	82.4	71.0	76.4	70.5
All PASSHE	74.4	65.6	75.1	63.4	52.5	64.3

Source: Pennsylvania State System of Higher Education Office of System Research. (2010). School Persistence and Graduation Rates Summary. Unpublished data set.

Table 3 below illustrates a comparison of the fourth, fifth and sixth year graduation rates for PASSHE universities in 1999. An even greater disparity exists

between graduation rates of African American and White students than persistence rates discussed above. The PASSHE overall fourth year graduation rate for the African American cohort was 28.7% while the fourth year graduation rate for the White cohort was 49.2%, a difference of 20.5%. Similar disparities exist for both fifth year and sixth year graduation rates. For African American students the fifth year graduation rate was 35.2% while White students had a fifth year graduation rate of 54.2%, a difference of 19%. The sixth year graduation rate for African American students was 37.5% and for White students was 55.4%, a difference of 17.9%.

Table 3
PASSHE Comparison of 4th, 5th & 6th Year Graduation Rates for 1999

University #	4 th Year Grad Rate (%)			5 th Year Grad Rate (%)			6 th Year Grad Rate (%)		
	All	African American	White	All	African American	White	All	African American	White
1	40.6	19.4	43.1	46.8	29.4	48.8	48.8	31.3	50.8
2	59.4	24.5	60.8	62.5	28.3	63.8	63.6	35.8	64.7
3	38.6	25.6	39.2	43.6	44.1	30.8	45.8	33.3	46.4
4	29.5	29.5	N/A	33.3	33.3	N/A	34.5	34.5	N/A
5	45.8	36.2	46.3	49.5	37.7	50.2	50.1	37.7	50.8
6	40.7	10.4	42.6	47.4	18.8	49.2	48.8	20.8	50.5
7	42.2	20.9	43.8	47.9	26.7	49.5	49.9	29.1	51.5
8	46.5	34.9	46.8	50.9	41.9	51.2	51.7	41.9	51.9
9	47.1	47.9	17.4	51.4	17.4	52.3	53.5	30.4	54.2
10	46.4	36.0	46.9	51.0	36.0	51.6	52.0	36.0	52.7
11	57.0	37.6	58.6	61.6	47.3	62.8	62.4	51.6	63.3
12	60.5	34.6	61.6	63.5	40.4	64.4	64.3	40.4	65.2
13	44.2	32.7	44.7	50.9	36.5	51.6	52.0	38.5	52.5
14	52.5	42.4	53.4	59.1	52.1	59.8	60.5	55.6	60.9
All PASSHE	47.7	28.7	49.2	52.7	35.2	54.2	54.1	37.5	55.4

Source: Pennsylvania State System of Higher Education Office of System Research. (2010). School Persistence and Graduation Rates Summary. Unpublished data set.

In order to improve the first and second year persistence rates and fourth, fifth and sixth year graduation rates, institutions have designed many programs and strategies.

For the purpose of anonymity the institution employed in this study was renamed “Ellen University of Pennsylvania” or (EU). EU has invested significant energy and resources during the last decade to improve its retention and graduation rates among students of color. EU is one of the oldest of the fourteen state-owned institutions of higher education within the system, which is known for its teacher education and liberal arts. As a member of the PASSHE, EU is a comprehensive public institution which provides exemplary undergraduate and graduate programs. What distinguishes EU from many of its peers is its commitment to undergraduate liberal arts. EU has gained recognition for enrolling and challenging a bright and diverse student body.

As outlined in Table 4 (shown below), EU has historically enjoyed the benefit of exceedingly high student retention and graduation rates. Its campus-wide four-year retention/graduation rate was 35.2% in 1996, while the five-year and six-year retention rates were 60.2% and 63.7% respectively. For the same period, the national four-year retention/graduation rate for all students was 22.3%, while the six-year retention/graduation rate was 47.7% (CSRDE, 2003-2004). More impressive is the retention rate of the White students enrolled at EU. When viewed as a single race, in 1996, the four-year retention/graduation rate was 38.2%, while the five and six-year retention rates were 63.6% and 66.5% respectively (CSRDE, 2003-2004). Although the university has been successful with its retention and graduation rates, it has been dissatisfied with its retention and graduation rates of its African American students. During the same time period, EU’s four-year retention/graduation rate for African American students was 14.9%, while the five and six-year retention rates were 41.8% and 51.3% respectively (CSRDE, 2003-2004).

When compared to national normative graduation rates for Public Masters I & II Institutions, EU fares well above the national trends. For the same period, the national four-year retention/graduation rate for White students was 24.3%, while the five and six-year retention/graduation rates were 42.2% and 47.8% respectively. The four-year retention/graduation rate for African American students was 13.1%, while the five and six-year figures were 27.2% and 33.4% respectively (CSRDE, 2003-2004).

Although EU's African American retention figures are above the national norms, in the four and five-year graduation rates during that time period, the disparity between the retention and graduation rates of the White students and African American students is alarming. This disparity of 23.3% for four-year graduation rates and 21.8 % and 15.2 % respectively for five and six-year retention and graduation rates between these two groups has come under serious scrutiny in reports and evaluations submitted by the Middle States Association of Colleges and Schools, the State System of Higher Education, and outside consultants. This study focuses on a population of undergraduate students associated with EU.

Table 4

Comparison of EU Graduation Rates vs. All Public Masters I & II (1996)

Race	EU			All Public Masters I & II		
	4 Year(%)	5 Year(%)	6 Year(%)	4 Year(%)	5 Year(%)	6 Year (%)
All	35.2	60.2	63.7	22.3	40.2	47.7
African American	14.9	41.8	51.3	13.1	27.2	33.4
White	38.2	63.6	66.5	22.5	42.2	47.8

Source: CSRDE (2003-2004), Office of Institutional Research (2008). Facts book, Millersville University

Purpose of the Study

Research involving college admission and retention has created a continuing interest in the identification of effective predictors of African American students' academic achievement in college. The purpose of this study is to develop a preadmission predictive model of student success for prospective first-time African American college applicants at a predominately White four-year public institution within PASSHE. This model will use two types of variables. They are (a) cognitive variables (i.e., SAT score, ACT score, high school GPA, high school rank, advance placement/college credit and ranking of high school), (b) non-cognitive variables (i.e., gender, race, family structure, parental income, and parental education). The cognitive and non-cognitive variables are used with African American and White college-bound students as a way of predicting their persistence and graduation at a four-year PWCU within the PASSHE.

This study is a quantitative correlational study. The predictor variables used in the study involve social and academic predictors including socio-economic level, family structure, SAT score, high school class rank and high school GPA. The criterion variables are the students' cumulative GPA while attending EU, and the percent of those students in the sample population that graduated from the institution. Various regression models that may include standardized coefficients and intercept dummy variables are used to understand predictive relationships among the variables.

Currently EU and other PASSHE schools only use SAT, ACT, high school GPA, high school rank and advanced placement/college credit as variables in its selection process.

Research Questions

This study addresses the following four research questions:

- 1) Can the overall academic success of African American freshmen be predicted on the basis of preadmission variables?
- 2) Which single variable will be the most significant in predicting the academic success of African American freshmen?
- 3) What set of variables will best predict the academic success of African American freshmen?
- 4) Is there a difference between African American and White students in terms of preadmission model predictors?

Hypotheses

This study will have two main hypotheses:

- 1) A significant relationship exists between the pre-collegiate data (predictor variables) and college GPA and graduation for both student groups.
- 2) A significant difference exists between African American and White student populations suggesting a need for separate predictor models that will yield differing sets of significant predictor.

Significance of the Study

Over the past three decades, many studies have dealt with post-admission predictor models of academic success rather than preadmission predictor models. These post-admission predictor studies helped to identify individual students at risk of attrition and helped colleges and universities to fashion intervention programs intended to prevent attrition. These previous studies are conducted as a way of fixing a retention problem

rather than preventing a potential one. The focus and purpose of this study is to develop a preadmission predictive model that will identify the retention rate and graduation rate of degree seeking first-time African American freshmen while at the same time comparing it to those first-time White freshmen at the same institution. This may lead to further insight into the challenges facing African Americans and the development of more effective retention initiatives.

Definition of Terms

For this study, the following definitions will be used:

Advanced Placement Credit (AP) - Through AP's college-level courses and exams, students are able to earn college credit and advanced placement, prior to attending college. More than 30 courses and exams across multiple subject areas are offered in high schools nationwide.

African American - An African American is a person living in the United States having origins in any of the Black racial groups of Africa.

American College Testing Assessment (ACT) - The American College Testing Assessment test (ACT) is one of the two major standardized college entrance tests taken in the United States today. Standardized tests like the ACT are designed to allow college admissions officers the opportunity to judge all students by a common standard of measure. The ACT tests knowledge in four subject areas: They are: English, Reading, Math, and Science Reasoning. The test has an overall maximum score of 36 and a minimum score of 1 a student can earn.

Attrition - Attrition is a negative term for retention and is used to describe the loss of students in higher education from particular cohorts over a period of six years.

Cognitive and Non-cognitive Variables - Cognitive variables are those which can be measured using traditional assessment and testing methods (e.g., SAT/ACT, high school GPA, high school rank, advanced placement/ college credit and ranking of high school). Non-cognitive variables are those which cannot be measured using traditional methods (e.g., self-concept, race, gender, family structure, and parental education).

Collegiate GPA – The grade point average a student earns during his or her academic experience while enrolled in an undergraduate program.

Cultural Capital- Cultural capital is made up of the forms of cultural knowledge, competences, or dispositions acquired by the privileged classes.

Disadvantaged Student - An individual who comes from an environment that has inhibited the individual from obtaining the knowledge, skill and abilities required to enroll in and graduate from a college or university. Students who are considered disadvantaged come from a family with an annual income below a level based on low income thresholds according to family size established by the U.S. Bureau of Census, and/or reside in a school district which is not sufficiently funded so that every student is provided an adequate education.

Ellen University of Pennsylvania (EU) – Renamed for this study for the purpose of anonymity, Ellen University of Pennsylvania (EU) was founded in 1855, and is one of the 14 state-owned universities within the Pennsylvania State System of Higher Education (PASSHE). With a student population of 7,259 undergraduate students during the 2008-09 academic year, EU has earned its place among U.S. News & World Report's top 10 public universities in the North. What distinguishes EU from many of its peers is its

commitment to the liberal arts. Over the years, EU has also gained recognition for enrolling and challenging a bright and diverse student body.

Family Structure – Defined by parental presence within the family. If both parents are present this would be considered an “in-tact” family. If parents are single, widowed, divorced or separated, it will be defined as a single-parent family. If the student is a “ward of the court”, they will be considered independent.

First Year Persistence Rates - First Year Persistence Rates are defined as those first-time full-time freshmen who have successfully completed their first year of coursework and are enrolled for their second academic year of coursework.

Free Application for Federal Student Aid – Commonly abbreviated as FAFSA, is the application used by students nation-wide to determine eligibility for state and federal grants each year.

Gender – Is defined as the sex of a person.

Graduation Rate - Graduation rate is defined in terms of first-time freshmen who complete a bachelor’s degree at that institution within a specific period of time.

High School Code – The code assigned by EU’s Admissions Office to each high school attended by students in the sample population.

High School Grade Point Average - The cumulative grade point average (GPA) earned by a student which includes grades 9 through 12. The students final GPA is determined during their senior year of high school.

High School Rank – A ranking a student receives based on the number of students in his/her class/cohort. The students’ final ranking is based on the students’ cumulative grade point average earned and is determined during the students’ senior year.

Historically Black Colleges and Universities (HBCUs) - As the result of segregation in higher education, Historically Black Colleges and Universities (HBCUs) were established early in the 1800s and lasted throughout our nation's history for the sole purpose of educating African Americans. However, as the result of the Supreme Court decision of 1954 in Brown vs. Board of Education, such policy and practices have been relaxed but these institutions still maintain a predominately African American student body. These institutions are accredited by a nationally organized accrediting agency as determined by the U.S. Department of Education.

Parental Education – The level of education the parents within the family have achieved.

Parental Income – The adjusted gross income of the parents of students in the sample population used by EU's Financial Aid Office as a way of determining financial aid eligibility.

Pennsylvania State System of Higher Education (PASSHE) - The Pennsylvania State System of Higher Education (PASSHE) is comprised of 14 state-owned universities and is the largest provider of higher education in the Commonwealth of Pennsylvania.

Headed by a Chancellor and governed by a 20-member Board of Governors, it is the tenth largest university system in the United States. Of the fourteen universities, thirteen are predominately White institutions, and one is a Historically Black institution.

Persistence - Persistence describes a student remaining on track to achieve their goal of obtaining a degree.

Post-admission Model - The analysis of selected post-admission cognitive and non-cognitive variables that colleges and universities use as a way of predicting the expected retention rate of their enrolled full-time students.

Preadmission Model - The analysis of selected preadmission cognitive and non-cognitive variables that admissions offices at colleges and universities use as a way of determining which variables best serve as positive predictors of incoming first-year full-time students' academic success at their institution.

Predominately White Colleges or Universities (PWCUs) - Predominately White Colleges or Universities (PWCUs) are institutions at which the majority of the students are White. They are accredited by a nationally organized accrediting agency as determined by the U.S. Department of Education. These institutions were established for Whites as the result of segregation in higher education. However, as the result of the Supreme Court decision of 1954 in Brown vs. Board of Education, such policy and practices have been relaxed, but these institutions still maintain a predominately White student body.

Public Master's Universities and Colleges I (Master's I Institutions) - Master's Universities and Colleges I (Master's I Institutions) offer a full range of baccalaureate programs and are committed to graduate education through the master's degree. They award 40 or more master's degrees annually in three or more disciplines.

Public Master's Universities and Colleges II (Master's II Institutions) - Master's Universities and Colleges II (Master's II Institutions) offer a full range of baccalaureate programs and are committed to graduate education through the master's degree. They award 20 or more master's degrees annually in one or more disciplines.

Race Code – The numeric value used by EU's Admissions Office for the purpose of identifying the race of students in the sample population.

Ranking of High Schools - Determined by using the public school rankings based on each school's performance data on state-wide standardized tests, which are implemented by the

Department of Education for each state. The ranking of a high school will be adjusted to accommodate for the difference in the number of school districts in each state. This adjustment formula will be $\text{MAX}-R$ divided by $\text{MAX}-1$ where MAX represents the total number of school districts in the state and R represents the ranking of the school district within that state. This will be represented as a percentile.

Retention - Retention describes the institutional perspective of students being retained by institutions for their entire course of study.

Retention Initiatives - Retention initiatives are programs or services that are in place on college and university campuses which serve to improve the retention of students (e.g., mentoring, early academic warning systems, tutoring, Freshmen Year Experiences (FYE), etc.).

Scholastic Aptitude Test (SAT) - Like the ACT, the Scholastic Aptitude Test (SAT) is the other major standardized college entrance test taken in the United States today. The current SAT includes three sections, each of which can earn a maximum score of 800 and a minimum score of 200. Standardized tests like the SAT are designed to allow college admissions officers the opportunity to judge all students by a common standard of measure.

Second Year Persistence Rates - Second Year Persistence Rates are defined as those first-time full-time freshmen who have successfully completed their first and second year of coursework, and are enrolled for their third academic year of academic coursework.

Social Capital - Social capital refers to those educational, social, and cultural relationships or advantages individuals from the upper and upper middle classes are believed to possess and benefit from.

Socio-economic Status (SES) - The economic and sociological combined total measure of a person's work experience and of an individual's or family's economic and social position relative to others, based on income, education, and occupation.

Students of Color or Persons of Color - Students of Color or Persons of Color will be used to describe the African American and Latino populations.

TRIO Programs - TRIO Programs are federally funded programs such as Upward Bound, Talent Search and Student Support Services.

Unique Identifier – The numeric value assigned to each African American and White student in the sample population for the purposes of confidentiality and anonymity.

Limitations and Delimitations of the Study

Due to its quantitative nature, this study will have a great deal of data to call upon which can be used in predictive equations. A qualitative study is not generalizable in terms of the target population for this study; however, it does provide outcomes usable by other researchers and program developers at a later time in fashioning more effective retention initiatives focused toward improving the retention rates of African American students.

In selecting the two sample groups, the African American sample comes from intact cohort groups. In order to provide a comparable sample group size of White students, this study is unable to use entire intact cohort groups. Instead, the White sample is made up of randomly selected students from the same freshmen cohort groups as those of the African American groups. Because all members of both study groups have graduated or failed to persist from the institution involved, this study makes no attempt to gather feedback from members of the two sample groups.

Lastly, other colleges and universities nation-wide and within PASSHE have varying admissions criteria and collect and manage the required data in different fashions. It should therefore be noted that the findings for this study use a “transferability” idea that follows qualitative research, and that the findings will only apply to those institutions similar in academic profile as the institution involved in this study.

EU was chosen for this study because large enough sample populations exist in both freshmen African American and White cohort groups to conduct this study. Both freshmen cohort groups will have a sample population of over 900 students, and the data is readily accessible through multiple queries to the EU Banner Student Information System (SunGard Higher Education, 2009).

CHAPTER II: REVIEW OF RELATED LITERATURE

Chapter Overview

This chapter is comprised of five parts: (1) a historical review of some existing cognitive and non-cognitive variables colleges and universities have used as a way of predicting student success; (2) the relevance of social and cultural capital as noted in the theories set forth by sociologists Pierre Bourdieu and James Coleman will also be introduced with the intent of investigating both theorists' work by looking at the interplay of social and cultural capital in the field of higher education and the potential it may have in playing an effective role in developing a predictive model for determining student success; (3) a discussion of four theoretical models of student retention which have made major contributions to the understanding of retention and attrition in higher education; (4) a discussion of the conceptual framework used in this study; and (5) a chapter summary.

Historical Background

Historically, research on student success has operationalized success as students' grades, persistence, graduation, cognitive gains (critical thinking, writing, etc.), affective domains (opinions, attitudes, behaviors) and/or multiple outcomes. For example, SAT or ACT scores, high school GPA and class rank have often been used to attempt to predict students' collegiate GPA. (May, 2006; Ramist, Lewis, & McCamley-Jenkins, 1994; Stricker, Rock, & Burton, 1996). A number of other studies have shown positive relationships between high school performance in specific subjects such as mathematics, English and the natural sciences and a students' success in college (Bridgeman & Wendler, 1991; Ethington & Wolfe, 1984; May, 2006).

There have been several additional sets of research concentrating on other predictive variables for student success in college including affective constructs, personality constructs, demographic indexes, interest measures, involvement and motivation (Allen, 1999; Astin, 1993; Berger & Milem, 1999; Elkins, Braxton, & James, 2000; Breen & Lindsay, 2002; Gelin, 2003; May, 2006; Pascarella & Terenzini, 1991; Struthers, Perry, & Menec, 2000). Further research has concentrated on students' perceptions of the academic environment (Beck & Davidson, 2001; May, 2006), perceived social support (DeBerard, Spielmans, & Julka, 2004; May, 2006) and self-efficacy and educational attainment (Grabowski, Call, & Mortimer, 2001).

In response to the research above, numerous theoretical frameworks and predictive models have been adopted by admissions offices to determine selection criteria. The predictive models have included factors like socio-economic backgrounds, alumni parents, athletic ability, high school and community activities, individual aptitude, high school class rank, Scholastic Aptitude Test (SAT) or the College Testing Assessment test (ACT) scores and self-concept. These models have served as useful tools for predicting students' success, and to explain why students, regardless of their race, are so often not retained at institutions of higher education.

Although the selection criteria used by admissions offices have evolved over time, the more basic question remains as to whether or not these criteria are indeed valid predictors of academic success and retention of students. Perhaps other combinations of factors, which are both cognitive and non-cognitive in nature, should be considered as valid predictors of student persistence and graduation. More specifically, since there is a growing concern about the retention and graduation of African American students, should

a more effective set of predictors be used for these students who have chosen to attend PWCUs?

Sociological Perspective

As the result of the numerous theoretical frameworks and predictive models developed over the years, sizeable foundations of knowledge exist on the question of which variables are best predictors of student success. Perhaps the theory most widely used has been Tinto's (1975, 1993) theory of student attrition. Because of its recurrence in literature, scholars have intently examined this theory, with many developing new approaches that may supplement or improve on previous research.

In order to understand Tinto's theory of student attrition, one must not view student departure from institutions as an individual phenomenon, but as one which relates to the student's pre-college environment, and as the foundation for the individual student's post-college possibilities and opportunities. For this aspect of his theory, one needs to focus first on those pre-college aspects which may affect a student's success at his/her college or university. Some socio-economic factors that Tinto feels may create obstacles include (a) household income level, (b) educational level of the parents, and (c) parents' occupation. Tinto's theory suggests that family background is often a powerful predictor of student success. Specifically, the higher a family's socio-economic status (SES), the greater the likelihood of the student's persistence in postsecondary education (Tinto, 1993). Although SES is a commonly used predictive variable, the effect of it on persistence is not equal for all groups of students, as differences exist based on a student's race (Paulsen & St. John, 2002; Wells, 2008).

Secondly, Tinto explains that changes in the student's environment, in this case his/her transition into higher education, necessitate a change in patterns of interaction. These changes consist of separating the student from their pre-college community and transcending him/her into a post-secondary environment in which the student interacts in new ways with members of the new community including (a) other students; (b) professors; and (c) higher education administrators and incorporation. This involves becoming an acclimated member of this new community by adopting the ideas and behavior of the existing members (Tinto, 1993).

A related correlational factor for student success is parental education, which is often considered a component of one's social class (Pascarella & Terenzini, 1991, 2005; Wells, 2008). Specifically, studies have shown that the persistence rates for first-generation students are, on average, lower than those of continuing-generation students (Duggan, 2002; Ishitani, 2003; Lohfink & Paulsen, 2005; Wells, 2008).

While SES, parental education and similar constructs have been shown to be important tools for predicting student success, new theories have emerged suggesting that social and cultural capital are also valid predictors of academic success and retention.

Although social capital and cultural capital are closely related, the constructs of each are distinct. Social capital encompasses those social and personal connections or networks that individuals capitalize on for interpersonal assistance and personal gain. Everyone develops social capital during their formative years in school, in their communities and in their homes (Bourdieu, 1986, Coleman, 1988; Wells, 2008). Cultural capital, on the other hand, includes cultural-based factors and indicators of symbolic wealth that help define an individual's class in society (Bourdieu, 1986; Wells, 2008).

Cultural capital is often inherited from one's family, and may sustain SES stratification based on families passing the torch of societal privilege and advantage (McDonough, 1997; Swartz, 1997; Wells, 2008). While many theories exist to affirm the relationship between family background and academic success and retention, it remains unclear whether the theories are equally applicable across different races.

Pierre Bourdieu and James Coleman Schema

The two major schools of thought on social and cultural capital were developed in the late 1980s by educational sociologists Pierre Bourdieu and James Coleman. Although they co-organized a conference in 1989 in Chicago and co-edited its proceedings (Bourdieu and Coleman, 1991), the developments of their conceptions of social capital were independent, and were each formed without reference to the other.

One common starting point for both theorists is their rejection of the idea that educational attainment and achievement is solely the product of an individual's natural talent. Both Bourdieu and Coleman employ an instrumentalist view of social capital as a resource, inherent in social relationships, which can be used by individuals to various ends, including academic success.

Bourdieu (1986) defines social capital as “the aggregate of the actual or the potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance and recognition –or in other words – to membership in a group- which provides each of its members with the backing of the collectivity –owned capital, a “credential” which entitles them to credit” (p. 249).

Similarly, Coleman (1988) defines social capital as “not of a single entity but a variety of different entities, with two elements in common: they all consist of some

aspect of social structures, and they facilitate certain actions of actors whether they are personal or corporate actors within the structure” (p. 98).

The family background indicators used by both theorists relating to student success included (a) parents’ presence, (b) number of siblings, and (c) parent’s expectation for their child’s education.

Pierre Bourdieu (1977, 1986) first used the concept of cultural capital to analyze how culture and education interact, thereby contributing to the social reproduction of inequality. Bourdieu’s argument is straightforward: High levels of cultural capital, or societal-valued knowledge of “high-brow” culture, are likely to exist in families of high SES and often translate into the greater likelihood of their child pursuing and succeeding in higher education. Bourdieu’s concept of cultural capital is considered a mediating factor between social origins and educational outcomes.

Bourdieu’s schema reveals the exclusionary character of cultural capital, proving it a useful conceptual extension of how social inequalities are reproduced, and assisting other theorists in attempting to make sense of the persistent disparities between the academic success of White students and students of color.

Also in Bourdieu’s theory (1977, 1986), high schools are not viewed as neutral institutions, but rather as institutions in which preferences, attitudes and behaviors of the “dominant class” or “high-brow” culture are valued the most. Bourdieu and other theorists believe that while lower- and working-class students may acquire the knowledge and skill-set necessary to pursue higher education and succeed, they are more likely to fail academically. Theorists attribute this, in part, to family SES, structure implications for the type and quality of high school a student attends, and the amount of attention and

level of expectation teachers place on students (Roscigno & Ainsworth-Darnell, 1999; Coleman et al. 1966).

Significantly, both Bourdieu and Coleman include in their conceptual frameworks the importance of the impact of family background on the resources parents can provide to their children. Household educational resources and “high-brow” cultural practices including access to (a) books, (b) computers, (c) newspapers, (d) museum visits, and (e) extracurricular classes in the arts, are particularly essential for shaping the type and quality of high school education a student receives, and the likelihood of pursuing a post-secondary education and achieving academic success.

Four Theoretical Models of Student Retention

As previously stated, the development of several key conceptual models has significantly contributed to the understanding of student retention and attrition in higher education. In the literature, four theoretical models from a total of five authors examining retention and attrition emerge as the most widely discussed and explored. Although they are not the first to research this subject matter, they produced seminal ideas that still continue to serve as the foundation for student retention and attrition research. The five scholars to be reviewed are William Spady (1970), Vincent Tinto (1975), Ernest Pascarella and Patrick Terenzini (1980) and John Bean (1980)

Spady’s Dropout Process

The first theoretical model to be examined was developed by William Spady (1970) who recognized the need for an “analytical-explanatory” approach to the study of student attrition in higher education. He expressed a desire to move beyond the existing literature toward a “more interdisciplinary-based, theoretical synthesis of the most

methodologically satisfactory findings and conceptually fruitful approaches to this problem” (p.64).

Spady’s model of the undergraduate dropout process (see Figure 1) is based on his 1970 study of French sociologist Emile Durkheim’s (1951) theory of egotistical suicide, which attributed some suicides to the lack of integration into society. Durkheim (1951) explains that the likelihood of suicide increases when there is insufficient moral consciousness (low normative congruence) and insufficient collective affiliation (low friendship support). Spady suggests that these same two types of integration directly affect student persistence or withdrawal from institutions, and therefore relate his model to Durkheim’s theory. He goes on to suggest that dropping out is a result of students not successfully assimilating into both the academic and social systems at their institutions.

Spady (1970) argues that family background is one of many factors exposing students to influences, expectations and demands, which in turn affect the student’s level of integration. Full integration calls for meeting the demands of the institution’s social and academic systems. Spady (1970) predicted that withdrawal would occur when the student perceived insufficient rewards within either the social or academic systems.

Spady’s (1970) model of the undergraduate dropout process contains five predictor variables: (a) grade performance, (b) intellectual development, (c) normative congruence, (d) friendship support, and (e) social integration. The first four of these variables influence the fifth, social integration. All of the variables are indirectly linked to the criterion variable, dropout decision, through two intervening variables, satisfaction and institutional commitment.

Spady (1971) put his model to the test using a sample comprised of 683 incoming freshmen at the University of Chicago. He was able to develop his sample using three types of data (a) student information provided on the admissions application, (b) student data provided on a follow-up questionnaire, and (c) information about the student's perception of the institution provided on the follow-up questionnaire. Spady was then able to use students' GPA and retention data from the institution to analyze the results (Spady, 1971). This level of access to such a large number of student participants was unprecedented for this time period.

Following his first longitudinal study using this model, Spady (1971) felt it necessary to make revisions to the model. For starters, he added structural relations as a variable and made friendship support a subset of it. This was in response to the finding that friendship support is "directly dependent on elements in both the family background and normative congruence clusters" (Spady, 1971, p. 58).

The other major revisions to the model occurred because Spady (1971) found significant differences based on gender. To address this, he changed some of the directional arrows and the paths to connect variables (see Figure 2). Specifically, he found that for male students, grade performance was the most important factor for determining attrition, while institutional commitment and social integration were secondary factors. For the majority of the male students, the focus was on meeting formal standards set by faculty. Male students displayed a willingness to tolerate the environmental conditions imposed on them in order to meet those formal standards.

Female students, conversely, tended to base the decision to dropout or persist primarily on institutional commitment with academic performance as a secondary factor

(Spady, 1971). Responses to subjective social criteria indicated that female students would not remain in an unsatisfying college environment.

However, for all students, the longer the students' tenure in college, achievement and persistence became tantamount. The study concluded that "formal academic performance is clearly the dominant factor in accounting for attrition among both sexes" (Spady, 1971, p. 38). An additional connection exists between institutional commitment and normative congruence. Spady (1970) notes the importance of this as a reflection of the cyclical nature of the model. He suggests that the process can have an effect on the individual, thus causing the student to change attitudes and interests.

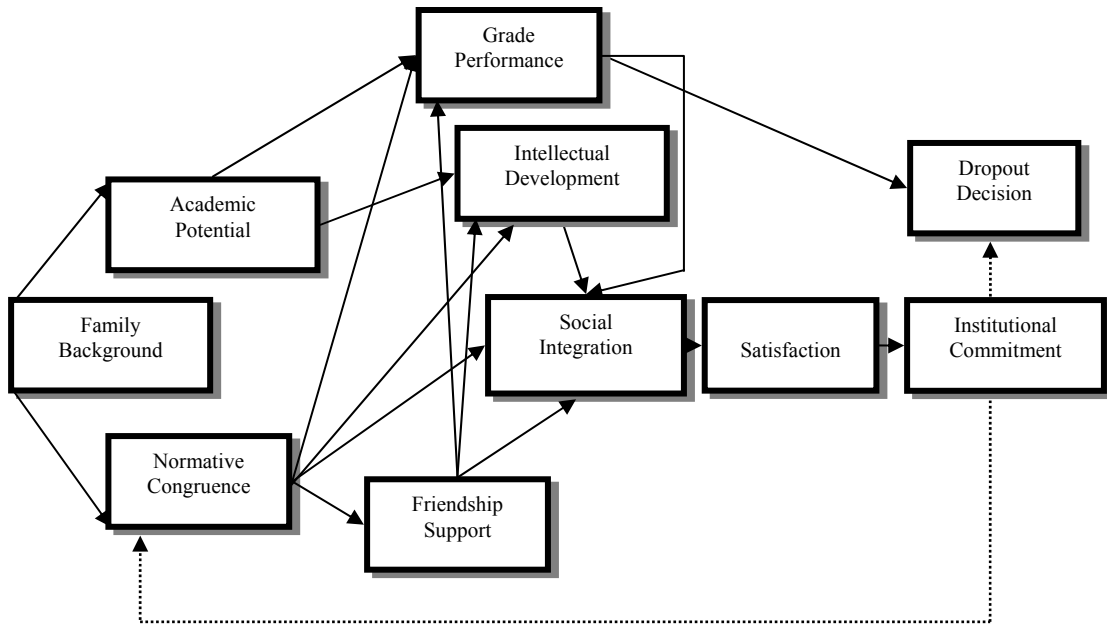


Figure 1. Spady's (1970) Theoretically Based Model of Undergraduate Dropout Process.

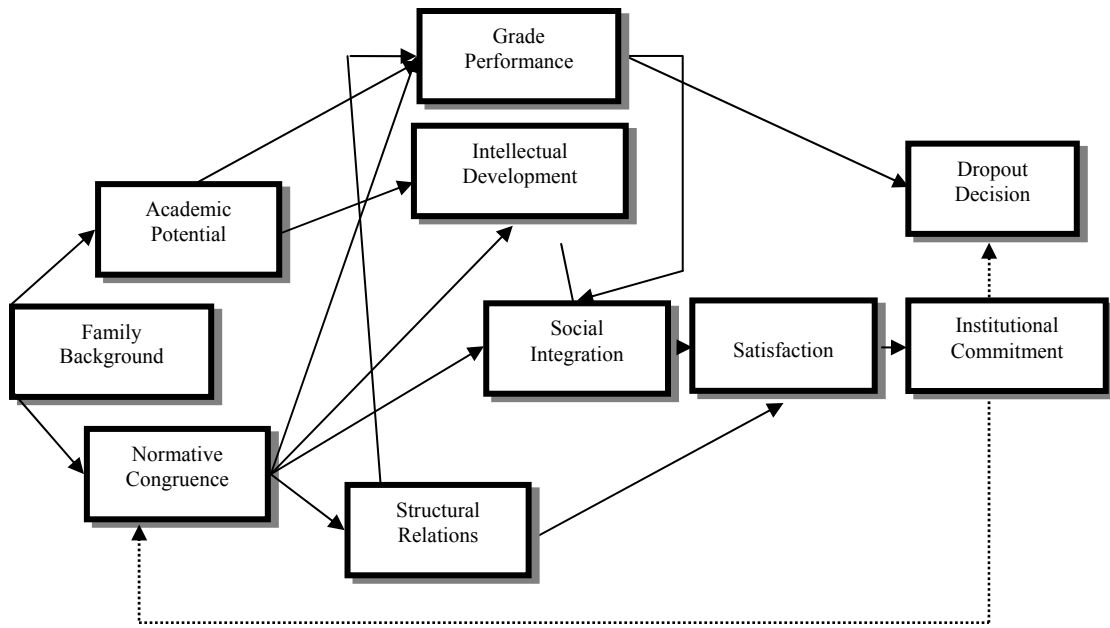


Figure 2. Spady's (1971) Explanatory Sociological Model of the Dropout Process.

Tinto's Student Integration Model

Building on Spady's (1970) concepts of the interrelationships of background characteristics, friendship support, academic potential, and shared group values, and incorporating Durkheim's (1951) theory of egotistical suicide, Vincent Tinto (1975) developed a Student Integration Model of Student Retention (see Figure 3). In developing this longitudinal, predictive theoretical model, Tinto added individual student characteristics and institutional factors to predict student movement in and out of college (Tinto, 1975, 1993). Since 1975, leading research in the field of student retention in higher education has been grounded on his framework. The basic principle of Tinto's model posits that college retention is influenced by student background characteristics, goals, commitments, academic integration and social integration (Tinto, 1975, 1987, 1993). Tinto measures successful academic integration based on grade performance and social integration based on the development and frequency of positive interaction with a

student's peers and faculty, as well as involvement in extracurricular activities. The higher the levels of academic and social integration, the less likely the student will be to withdraw (Tinto, 1975, 1987, 1993).

The work of social anthropologist Arnold Van Gennep was also influential on Tinto's Student Integrative Model. Van Gennep's "The Rites of Passage" (1960) study proposed that there were distinct stages in the transformation of individuals from one group to another. Further, each stage in the individual transition to adulthood involved a different kind of interaction/transition between that person and other members of society (Van Gennep (1960). Tinto (1993) suggests that "rite of passage" concepts are analogous to the college students' academic and social integration process, and that persistence requires individuals to disassociate themselves from past relationships in order to make the transition to college, and become fully integrated into the social and intellectual life of that institution.

Further, Tinto's model suggests that students enter their college or university with particular characteristics which combine to influence students' initial commitments to that institution and the goal of graduating, and can also contribute to the departure process even before the students' first day of classes. These characteristics include family background (e.g., parents' level of education and socio-economic status), individual attributes (e.g., gender and age), and pre-college educational experiences (e.g., high school grades, class rank and SAT/ACT scores).

While the reasons that students decide to leave institutions vary greatly, Tinto (1993) identified eight distinct factors that may predict student departure from college. They are (a) intention, (b) commitment, (c) adjustment, (d) difficulty, (e) congruence, (f)

isolation, (g) obligations, and (h) finances (Tinto, 1993). Tinto (1993) identified intention and commitment as the crucial characteristics for entering students, while adjustment, difficulty, congruence and isolation become more relevant once students are fully enrolled. The final two factors, obligations and finances, are identified as external factors influencing students while enrolled in higher education.

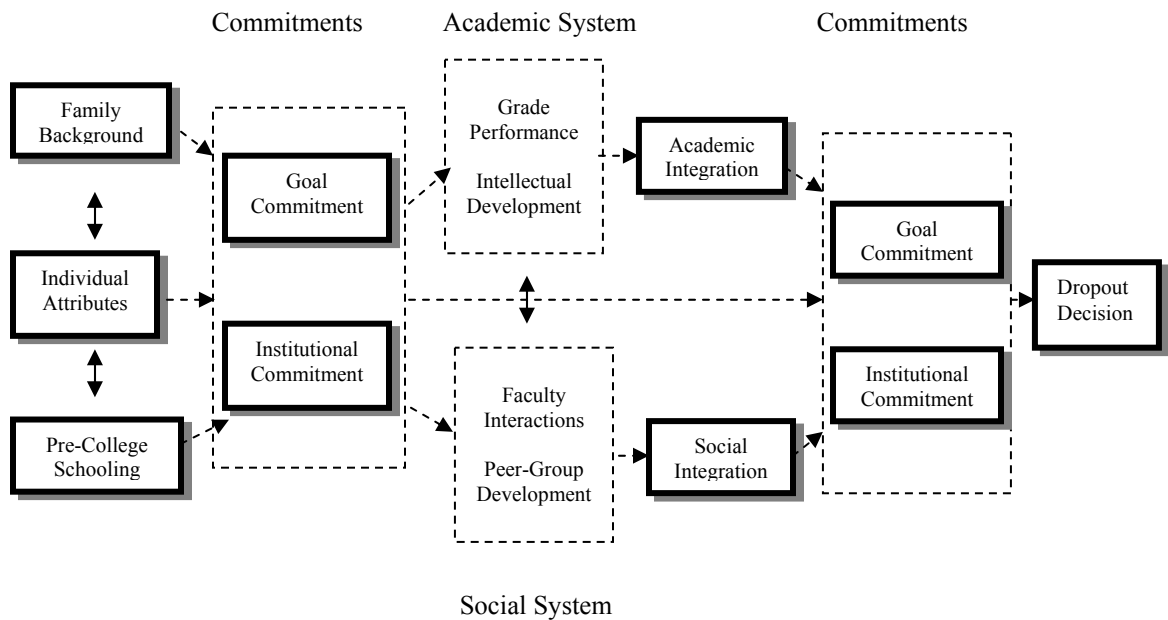


Figure 3. Tinto's (1975) Student Integration Model of Student Retention.

Pascarella and Terenzini's Student Persistence Model

Building on the theories of Spady and Tinto, Ernest Pascarella and Patrick Terenzini (1980) developed their own Student Persistence Model in 1980 (see Figure 4). As the result of their extensive research, Pascarella and Terenzini confirmed Tinto's (1975, 1987) theoretical view that student background characteristics are influential in students' decision to persist. However, Pascarella and Terenzini (1980) state that student background characteristics alone are not reliable predictors of persistence, and that other

factors must be considered. In their study, they find strong evidence that the absence of significant student interactions with other college members is the single leading predictor of college attrition (Pascarella and Terenzini 1980). They add that variables such as the classroom environment and formal and informal interactions with faculty are instrumental in developing students' academic and social integration, thus encouraging persistence in higher education (Pascarella and Terenzini 1980).

Pascarella and Terenzini (1980) also found that the educational and interpersonal climates created on campuses serve as powerful predictors of how students actually experience college life, and in turn, the success of their undergraduate education. A student's own efforts to become involved in the climate of the campus are certainly critical to fully experiencing college life and receiving the benefits available. However, the way the institution is structured, and the way it works to socialize students, can create both the opportunities for, and expectations of, student involvement.

The Student Persistence Model of Pascarella and Terenzini (1980) reinforces Tinto's theoretical view that student-institutional fit, specifically a students' integration into the academic and social systems of their institutions, are the key ingredients to student persistence. Pascarella and Terenzini (1980) conclude that the lack of integration into the college environment due to insufficient contact with members of the institution is often the most important predictor of student attrition.

Factors considered in Pascarella and Terenzini's model (1980) are (a) student background (e.g., aptitude, personality, high school achievements and experiences) (b) structural/organizational characteristics of institutions (e.g., institutional size, admissions standards and academic standards), (c) interactions with agents of socialization (e.g.,

faculty and peer culture interactions), (d) institutional environment (e.g., institutional policies and safety), and educational outcomes/quality of student effort (e.g., academic performance, career aspirations, college satisfaction and institutional integration).

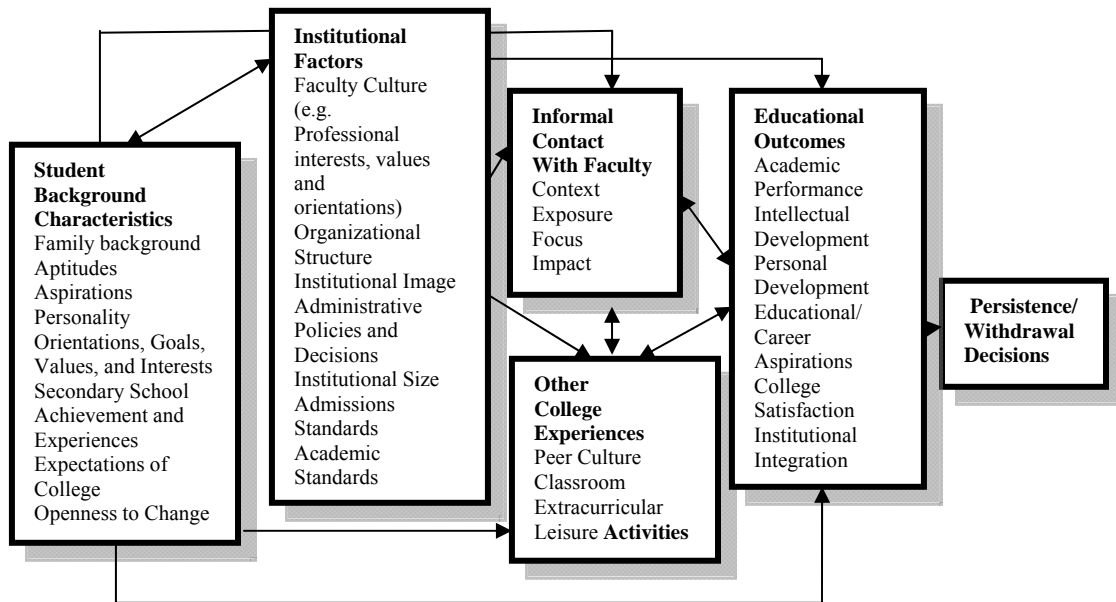


Figure 4. Pascarella and Terenzini's (1980) Student Persistence Model.

Bean's Student Attrition Model

John Bean's (1980) Student Attrition Model (see Figure 5) was developed to explain the variations in student attrition. Rather than using Durkheim's theory of egotistical suicide, he relied instead on models of corporate attitude-behavioral interactions and turnover in industrial environments (Bean, 1980). For Bean, a student's decision to leave college is analogous to employees' decision to leave the workplace. Further, Bean postulated that student departure decisions were based on a complex interrelationship of both non-cognitive factors, such as attitudinal and behavioral intentions that affected students' decision to drop out or persist, and environmental

factors, such as the approval of family and friends (Bean, 1980). For Bean, beliefs shape attitudes, and attitudes, in turn, shape behavioral intents. Bean's research suggests that beliefs are affected by students' experience with the different components of an institution, specifically institutional quality, courses and friends (Cabrera, Castaneda, Nora, & Hengster, 1992). Bean's model also recognized that factors external to the institution play a major role in affecting both attitudes and decisions students make related to dropping out or persisting.

In Bean's (1980) theoretical model, it is the organizational factors that affect individual satisfaction, which in turn influence students' decision to persist or depart. Further, background characteristics are included in Bean's theory because they influence how the student will interact with the organization. Similar to models of theory of attrition based on organizational turnover, which emphasize the impact getting paid has on organizational turnover in the work place, Bean's (1980) model emphasizes college GPA, perceived institutional quality and the practical value of education, as factors significant to students enrolled in higher education.

Although Bean noted that the attrition process differs between colleges and universities, there are commonalities with Tinto's model. In particular, "institutional commitment" as a leading factor in determining the likelihood that a student will drop out of college (Bean, 1980). Both theorists also recognize that for retention to occur there must be a "fit" or some type of commitment between the student and the institution (e.g., courses and academic integration), and that the decision to persist or depart is impacted by a complex mix of interactions over a period of time.

The main difference between these two theorists is that Bean's (1980) model regards academic performance as a result of social-psychological processes, whereas Tinto's model suggests that academic integration leads to enhanced academic performance.

In sum, "institutional fit" is critical to student persistence for Bean's (1980) Student Attrition Model. Students' beliefs and attitudes are shaped by the organizational factors in the institution and by outside family and friends. Further, satisfaction with the institution increases the level of commitment, which determines persistence behavior. Students whose beliefs and attitudes have been positively affected by external environmental factors such as (a) parental approval, (b) financial assistance, and (c) opportunity to transfer and those internal environmental factors such as (a) academic experiences, (b) grades, (c) faculty, (d) social life, and (e) campus climate, will be more likely to remain enrolled at their institutions (Bean, 1980).

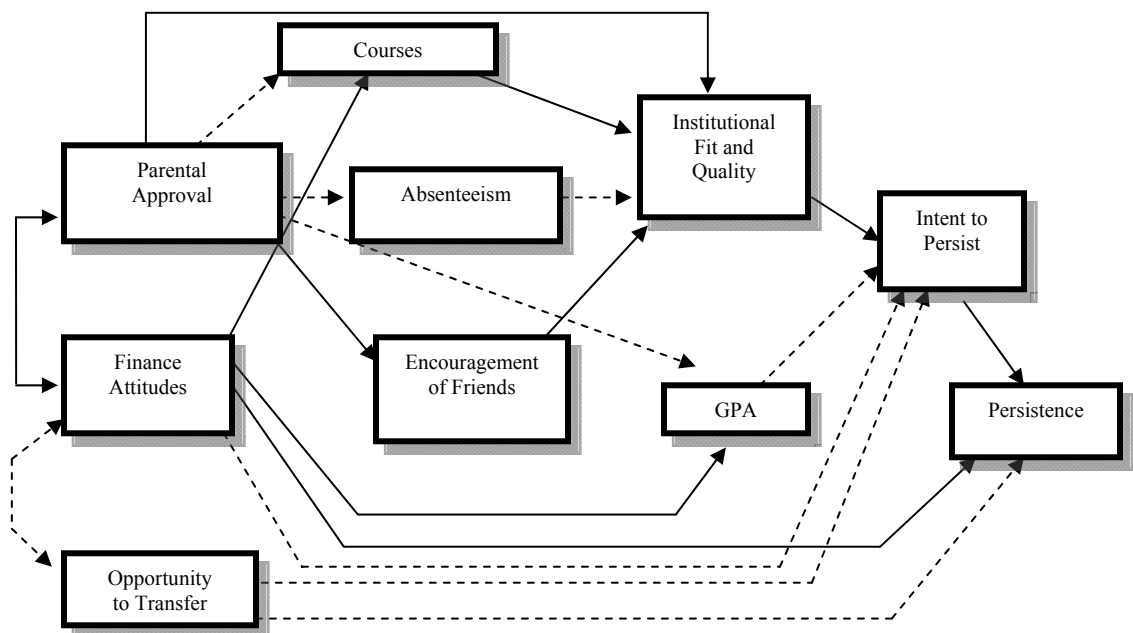


Figure 5. Bean's (1980) Student Attrition Model.

Theoretical Model Synthesis

In developing a theoretical retention model to explain how specific factors or categories of factors affect students' decision to persist at or depart from an institution it is inevitable that researchers will consider the same factors or categories, looking at them in a variety of ways and combinations. As a result, many models may focus on similar factors but offer different perspectives. Building on the work of Pietras (2009) in synthesizing the theoretical models to determine those similar and different perspectives of the theorists, the results of this research will find similar factors in the theoretical models and offer different perspectives from those of Pietras (2009).

The four theoretical research models presented here have numerous similarities. All four are highly regarded and have contributed to the understanding of student retention and attrition. The primary emphasis of each model is student-institution interaction, although each model asserts the need for consideration of background characteristics affecting students prior to their enrollment at an institution. In other words, all four models acknowledge the importance of pre-collegiate factors but focus on the characteristics that can be more reasonably controlled at the institutional level.

This review of literature reveals that Spady's (1970) and Tinto's (1975) models share many similarities. Building on Spady's (1970) concepts, Tinto included more factors, and looked at ways to make his theory predictive rather than descriptive. Tinto also expanded Durkheim's theory by drawing parallels between institutional departure and insufficient integration by individuals into society. At the core of his model, Tinto borrowed Spady's use of Durkheim's two postulates to identify the concepts of academic and social integration. Academic integration was thought to be the result of sharing

academic values and social integration was viewed as the result of developing friendships with other students and faculty. In Tinto's model, a student who does not achieve some level of academic or social integration is very likely to withdraw from their institution.

The models of Bean (1980) and Tinto (1975) are similar in most respects except in respect to the effect of external factors. Bean proposed that the role factors external to the institution play on the persistence process is far more complex and comprehensive than Tinto suggested. Based on a model of turnover in industrial environments, Bean's model evolved into one where the overall structure is based on a psychological model which links college retention with similar past behavior, normative values, attitudes and intentions. Bean's the model is similar to Tinto's in that it is complex and longitudinal and both theorists recognize that for retention to occur there had to be a "fit" or some type of commitment between the student and the institution.

Bean's model posits that background variables, particularly a student's high school achievement, educations goals and family support influence the way a student interacts with their institution both academically and socially.

Also building on the theories of Spady and Tinto, Pascarella and Terenzini developed their own student persistent model in 1980. As the result of their extensive research they found three variables (a) academic integrations (b) social integration, and (c) gender significantly related to persistence. Other factors considered in their study are (a) student background (b) structural/organizational characteristics of institutions, (c) educational outcomes, and (d) institutional environment.

To make the synthesis of the four theoretical models easier to interpret, predictor variables from all the models have been combined onto one chart with check marks for

each variable belonging with each theorist's model (see Table 5). The purpose of developing this comparison table is to make similarities and differences readily accessible in one visual aid.

In the development of Table 5, careful attention was given to listing the variables exactly as each theorist named them. In an effort to identify recurring themes within the theoretical frameworks, the variables within the comparison table were developed by attempting to translate the names theorists ascribe to variables into a common language. Since William Spady was the pioneer in the study of retention and attrition, his terminology is used as the foundation and the variables used by subsequent theorists are converted into his verbiage whenever possible without disrupting the intended meaning.

For example, Spady (1970) used the term grade performance to represent an extrinsic reward of earning grades, and any variable related to GPA was included in this variable. Further, Spady (1970) termed an intrinsic reward of learning and growth as intellectual development, a term also used by other theorists.

Spady (1970) termed the individual's compatibility with the institutional environment normative congruence. This includes matching attitudes, norms and values. Since students' background affects norms and values, including financial attitudes, the family background, student backgrounds and educational outcome variables used by Tinto (1975) and Pascarella and Terenzini (1980) seem to fit here, along with Bean's (1980) financial attitudes variable.

Friendship support, Spady's (1970) term for "the establishment of close relationships with others in the system" (p. 77), was later modified to structural relations because he included dating, faculty contact and extracurricular activities in his definition

of the variable. This term, along with Tinto's (1975) peer group development variable, Bean's (1980) encouragement of friends variable, and , Pascarella's (1980) other college experiences variable, all will be included under Spady's (1971) social integration variable. Spady (1971) defined this as a student's "sense of belonging and fitting in, reactions to the general warmth of interpersonal relationships on campus, and the perceived absence of pressures arising from normative differences" (p. 44).

The second table illustrates a modified synthesis of the model variables (see Table 6) which creates a significant reduction in the number of variables, making the overlap easier to understand. To create this table, additional terms with similar meanings were combined, specifically intent to persist from Bean's (1980) model, and goal commitment from Tinto's (1975) model are both represented by the latter term. Also, Bean's (1980) and Pascarella's (1980) organizational variable and Spady's own satisfaction variable are consistent with the broad term institutional commitment, defined by Spady as the level of importance a student places on graduation from the institution (1971).

Table 5

Comparison of Model Variables

Theorist	Model Name	Grade Performance	Intellectual Development	Normative Congruence	Social Integration	Intent to Persist	Goal Commitment	Institutional Commitment	Pre-college Achievement	Financial Attitudes	Organizational
William Spady	Dropout Process (1970)	X	X	X	X	X	X	X			
Vincent Tinto	Student Integration Model (1975)	X	X	X	X	X	X	X	X		
John Bean	Student Attrition Model (1980)	X		X	X	X	X	X	X	X	X
Ernest Pascarella and Patrick Terenzini	Student Persistence Model (1980)	X	X	X	X	X		X	X		X

Table 6

Synthesis of Modified Model Variables

Theorist	Model Name	Grade Performance	Intellectual Development	Normative Congruence/ Family Background and Educational Outcome	Social Integration	Intent to Persist	Goal Commitment	Institutional Commitment	Pre-college Achievement
William Spady	Dropout Process (1970)	X	X	X	X	X	X	X	
Vincent Tinto	Student Integration Model (1975)	X	X	X	X	X	X	X	X
John Bean	Student Attrition Model (1980)	X		X	X	X	X	X	X
Ernest Pascarella and Patrick Terenzini	Student Persistence Model (1980)	X	X	X	X	X		X	X

Significance of the Study

Drawing from theoretical retention frameworks of Spady (1970), Tinto (1975), Pascarella and Terenzini (1980), and Bean (1980), and others, which have been previously discussed in this chapter, a number of empirical studies of retention and attrition have been conducted. Using Tinto's (1975) interactionalist framework, Pascarella and Terenzini's (1980) theoretical model, and other retention models, several studies suggest that student background characteristics such as high school grades, high school rank and ACT/SAT scores influence student persistence. Other studies have suggested that Social Integration and Academic Integration are key variables related to student persistence (Townsend, 2006, Reason, 2003, Washington & Schwartz, 2002, Graham, 2001, Osher, & Kneidinger, 2000).

Townsend (2006) conducted a study in which he examined the impact of social involvement on student retention at a HBCU. He surveyed approximately 337 full-time, first-year African American students using the College Student Experiences Questionnaire (CSEQ). Using quantitative analysis, he found that social involvement had a significant positive effect on student retention. Specifically, Townsend found that after taking the other variables in his model into consideration students who are more socially involved with campus life are twice as likely to persist in college as students who are less socially involved.

Drawing on Tinto's (1975) interactionalist framework, Caplan (1997) examined the influence social integration had on students' intentions to persist in college. During the course of his social integration research, Caplan collected self-reported survey data from 786 first-year African American and White students at a large private university

which was predominantly White. Employing multiple regression analysis, Caplan (1997) found that social integration into the university campus community positively influenced commitment to remain in college for both African American and White students.

In addition to Tinto's (1975) model, retention researches have drawn from Pascarella and Terenzini's (1980) student persistence model as a way of studying retention. Allen (1999) used Pascarella and Terenzini's persistence model to examine what influence, if any, student background characteristics had on retention. Allen collected data at two separate times over a two year period from a sampling of 581 first-time freshmen at a four-year public institution. The sample population he used was comprised of White, African American, Latino, and Asian students. Employing weighted least squares regression analysis, Allen examined the parallel relationships, if any that may exist between persistence, student background characteristics and academic performance. Using students' high school rank as a measure of pre-college academic preparation, Allen found that high school rank has a significant correlation to students' decisions to withdraw for both students of color and White students. Allen also concluded that on the average, students of color are more likely to have lower high school rank and lower persistence rates than White students. Results from Allen's study are consistent with the results from a study by Nora and Cabrera (1996), which suggests that academic background characteristics play a key role in the persistence process.

Also drawing on Tinto's (1975) interactionist framework, and employing ordered logistic regression analysis, Mayo, et al. (1995) in his research on student retention, used survey data collected from 315 African American students and 340 White students at a large predominantly White public university for the purpose of examining

the social integration process of students. The study sought to determine which category of social integration variables, if any, affected the students' academic performance. Academic performance, the criterion variable, was measured by using students' cumulative GPA's. The results of the Mayo, et al. (1995) study found that formal social integration (e.g., interaction with faculty and administrators) had a much greater impact on African American students' academic performance than that of informal social integration (e.g., student's peers, involvement in extracurricular activities on campus).

Drawing on a conceptual framework co-developed by researchers Bean and Metzner (1985) and employing logistic regression analysis, Graham (2001) used a sample of 1,949 first-time degree-seeking residential and commuting freshmen at a HBCU which operates on an open admissions basis to examine the influence of background characteristics (e.g., ACT test scores, ACT math sub-scores, adequacy of prior education, high school GPA and high school rank) on student retention. The results of Graham's (2001) study suggest that student retention is positively influenced by (a) ACT test scores, (b) ACT math sub-scores, (c) high school grade point average, and (d) high school rank. Graham (2001) also examined the number of hours student spent studying per week, and found that, when compared to students who did not persist at the institution, returning students were significantly more likely to study a greater number of hours per week than non-persisting students. These findings are consistent with Bean's (1980) and Tinto's (1975) theoretical frameworks which hypothesize that academic integration are a key part of student persistence.

Drawing on the theoretical framework of Tinto's (1975) interactionist theory, Milem and Berger (1997) co-developed an integrated model of student retention to better

understand the process of student transition and integration as they relate to student persistence. They hypothesized that Tinto's (1975) concept of student integration would be helpful in boarding the understanding of a model of student persistence. Further, Milem and Berger (1997) argued that a model containing specific behavioral and perceptual components of integration would better be able to explain how student interactions with the social and academic systems of a campus affect the student integration process.

As part of their study, Milem and Berger (1997) used survey data collected at three different times during the same school year from 718 first-time freshmen at a selective private university. They employed path analysis and ordinary least squares regression to test their model, yielding several results. These results were (a) women are more likely to report higher levels of early involvement with their peers but lower levels of early involvement with faculty, (b) student perceptions about their experiences formed at the institution during the fall semester influenced the nature and extent of involvement at the institution during subsequent semesters, (c) there was a strong positive relationship between involvement with faculty and perceptions of institutional support, (d) perceived institutional support was strongly related to academic integration and perceived peer support was strongly related to social integration, (e) students who reported higher levels of involvement with peers during the spring semester were likely to report higher levels of academic integration, social integration, and institutional commitment, (f) students who reported higher levels of involvement with faculty were much more likely to report higher levels of academic integration, (g) social integration was more influential in predicting student persistence than academic integration, and (h) commitment is a strong

positive predictor of a student's likelihood to persist. These results suggest that the extent to which students become involved at an institution during the first six to seven weeks of a semester is significantly and positively related to the likelihood of their persistence at the institution.

Building on their earlier work, and using concepts from Astin's (1984) student involvement framework and Tinto's (1975) interactionist theory, Berger and Milem (1999) examined the relationship between behavioral involvement (Astin, 1984), perceptual integration (Tinto, 1975), and the college persistence process. They employed path analysis to test direct and indirect effects of constructs from their revised integrated model (Milem and Berger, 1997) on student persistence. Unlike the earlier model, which measured persistence based on students' assessment of their intent to return or not return to the institution, the revised model used actual measures of persistence. The specific results showed (a) social integration has a statistically significant direct effect on persistence, (b) perceptions of institutional support demonstrate a negative indirect effect on academic integration, while perceptions of peer support have a positive indirect effect on persistence, (c) high school GPA is a predictor of early involvement and perception, and (d) early involvement with faculty increases the possibility that students will have positive perceptions of institutional support and subsequent institutional commitment.

One important result pertaining to African American students emerged from Berger and Milem's (1999) study; African American students' perceptions of institutional supportiveness influenced their college persistence. This finding is consistent with Allen's (1992) claim that supportive college and university environments convey to

African American students that it is safe to take risks associated with intellectual growth and development and increase the likelihood that they will succeed.

Much of the research discussed supports the belief that African American students' educational outcomes are impacted by background characteristics, and the quantity and quality of academic and social integration at their institution can also play a beneficial role in student persistence. However, there are a number of limitations of past research on retention, specifically those related to the retention of African Americans. This study will look to overcome the limitations of past research by investigating the use of both cognitive and non-cognitive variables as a way of predicting academic success and graduation rates using a preadmission model rather than a post-admission research model. Findings from this research could significantly change the admissions criteria used at Ellen University and other universities similar in academic profile, and assist program developers in creating more effective support programs for African American students at their institutions.

Limitation of Past African American Retention Research

According to Stith and Russell (1994), there are only a minimal number of studies that examine the retention of African American students who attend HBCUs. Despite the noteworthy accomplishments of these institutions, HBCUs still struggle with low retention rates. Secondly, Connor (1990) and Davis (1994) contend that most retention studies examine retention patterns of African American students enrolled at PWCUs. Thirdly, Davis (1994) continues to argue that the primary focus of research addressing the retention of African American students has been on the differential experiences relative to White students.

All of these studies deal with post-admission predictors of academic success rather than a preadmission instrument or model. These studies helped to identify individual students at risk of attrition and helped program developers to fashion intervention programs intended to prevent an undesirable outcome. Such studies are implemented as a way of fixing a retention problem rather than preventing a potential one.

Conceptual Framework

Drawing from Spady's (1970, 1971), Tinto's (1975), and Pascarella and Terenzini's (1980) theoretical frameworks which emphasize the influential role background characteristics play in students' decisions to persist, a conceptual model was developed for the purpose of predicting overall academic success of African American freshmen. This conceptual model also builds on the four other factors or categories (e.g., academic integration, social integration, institutional factors, and other college experiences) used in the student persistent models mentioned by the theorists above that will best predict the success of students once enrolled at their institution. In this study, African American students in particular will be the focus. This study will develop a preadmission predictive model of student success for prospective first-time African American college applicants at a predominately White four-year public institution within PASSHE.

Student background characteristic constructs, as highlighted in Figure 6, will be the major basis of this study, with two types of variables as defined in Chapter I (see Figure 6); (a) cognitive variables (i.e., SAT, ACT, high school GPA, high school rank, advance placement, college credit, ranking of high school, student's GPA at EU) and (b)

non-cognitive variables (i.e., gender, race, family structure, parental income, and parental education). Traditionally, the college admissions process uses only cognitive variables as previously mentioned as a way of determining the admissibility of students to their college or university. This study, however, will use both cognitive and non-cognitive variables as a way of predicting persistence and graduation for both African American and White college-bound students at a four-year PWCU within the PASSHE.

Retention

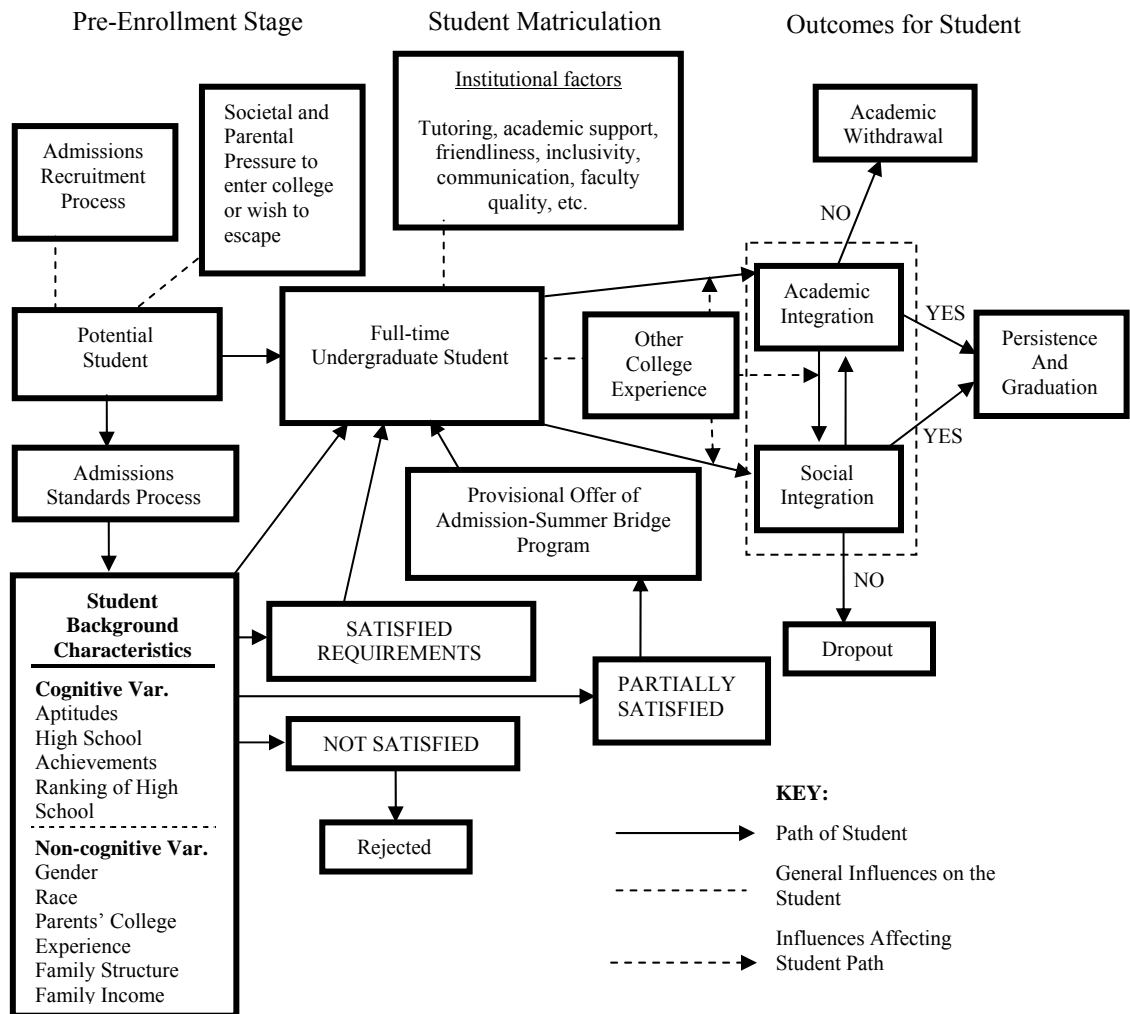


Figure 6. A New Preadmission Conceptual Model for Undergraduate Retention.

Summary

This chapter presented a historical review of some existing cognitive and non-cognitive variables colleges and universities have used as a way of predicting student success. The sociological schemas of Pierre Bourdieu and James Coleman's two major schools of thought on social and cultural capital are also introduced. Additionally, four key models from five authors' theoretical frameworks were discussed and synthesized to determine which variables best serve as predictors of student success. The theoretical concepts discussed provide the basis for the development of a new preadmission conceptual model for the purpose of not only predicting the overall academic success of African American students, but their four, five and six year graduation rates also. This integrated preadmission model of undergraduate retention will be presented in greater detail beginning with the procedures outlined in chapter three and continued throughout the following chapters.

CHAPTER III: METHODS

Chapter Introduction

As discussed in the literature review, attrition of first-time freshmen is especially important as a large proportion of these students do not complete their degree at their initial institutions. Of particular concern is the attrition rate of African American students relative to White students. Statistics have shown that the attrition rates of African American students enrolled in higher education institutions on predominately white campuses have grown as rapidly as the enrollment. Tinto (1975, 1987, 1993), Spady (1970, 1971), and Pascarella and Terenzini (1980) identified some possible causes of student attrition, specifically citing academic and social integration as reasons that influence students' decisions to persist in college or drop out. They found that students arrive on campus with various built-in characteristics, which play a significant role in their persistence. These characteristics are found to be influenced by family backgrounds, high school educational achievement, academic abilities and other personal attributes.

Over the past two decades, researchers have developed an increasing interest in the identification of effective predictors of student success. Relationships between traditional measures such as SAT scores or high school achievement and subsequent college outcomes have been studied. Research has also been directed toward assessing the effectiveness of student attitudes as predictors of persistence and achievement. Student characteristics such as academic self-concept, achievement expectancies and goals have been referred to as non-cognitive variables. Students' expectations of their academic performance have also been found to be significant predictors of college grade performance.

Most of the published research discussed in Chapter II deals with research related to post-admission predictors of academic success rather than preadmission predictors. Although a majority of the research conducted in the area of retention and attrition has been done at PWCUs, which has yielded mixed results, there has been little research conducted on African American predictor models for academic success.

Research Question

This study addresses the following four research questions:

- 1) Can the overall academic success of African American freshmen be predicted on the basis of preadmission variables?
- 2) Which variable will be the most significant in predicting the academic success of African American freshmen?
- 3) What set of variables will best predict the academic success of African American freshmen?
- 4) Is there a difference between African American and White students in terms of preadmission model predictors?

Hypotheses

This study has two main hypotheses:

- 1) A significant relationship exists between the pre-collegiate data (predictor variables) and college GPA and graduation for both student groups.
- 2) A significant difference exists between African American and White student populations suggesting a need for separate predictor models that will yield differing sets of significant predictor.

Setting of the Study

The students involved in the study are new first-time freshmen at EU. The institution is one of the oldest regional state-supported universities and is a member of the PASSHE system. This institution has historically been recognized for enrolling a culturally diverse student body from throughout the Commonwealth of Pennsylvania, the Mid-Atlantic Region, Northern United States and world-wide. This institution was selected for the study because of the similarities in the admissions criteria and academic profiles of the White and African American students at the institution.

Study Sample

Before beginning this study, an application was submitted and approved by the Institutional Review Board for the Protection of Human Subjects (IRB) at Indiana University of Pennsylvania. The sample used in this study is comprised of 960 African American and 1,046 White full-time and first-time enrolled freshmen from the 1993 to 2003 fall cohorts at EU. The total sample population of 2,006 students represents freshmen offered regular admission or special admission at EU for the fall semesters described above. Students in these sample populations represent a wide spectrum of academic preparation, socio-economic backgrounds, family structure and parental education. While the African American sample represents intact cohort groups, a similar number of White students from the same freshmen cohort groups were randomly selected as described in the data collection section below. This sample selection was completed with the assistance of the Office of Institutional Research at EU.

Data Collection

All of the data for this study were collected during the spring of 2010. A complete list of first-time African American freshmen from the 1993-2003 cohorts was obtained from the Office of Institutional Research at EU. Data on family structure, parental education and parental income were provided by the Office of Financial Aid at EU. It should be noted that parental income for this study was not available through the Free Application for Federal Student Aid (FAFSA) for years prior to the fall of 1995. Additionally, it should also be noted that parental education of father and mother was not available through the Free Application for Federal Student Aid (FAFSA) for years prior to the fall of 1999.

The data for this study were accessible through multiple queries to the EU's Banner Student Information System and the Banner Financial Aid System (SunGard Higher Education, 2009). Information regarding the following cognitive and non-cognitive variables was obtained using the Banner Student Information System: gender, race code, SAT score, ACT score, advanced placement credit/college credit, high school GPA, high school rank, and collegiate GPA and graduation status. Data on the following non-cognitive variables were obtained using the Banner Financial Aid System: family structure, parental education and parental income. All students' information was compiled by a research associate at EU and all unnecessary and sensitive data, including student names, social security numbers were deleted. Student names, which are considered confidential, were assigned numerical codes prior to turning this data over to the researcher.

Variables and Definitions

For the purpose of this study, six predictor cognitive variables were selected. They are SAT, ACT, high school GPA, high school rank, advanced placement/college credit and ranking of high school. There are also five predictor non-cognitive variables which will be measured; gender, race, family structure (in-tact family, single parent family, ward of the court), parental income and parental education (father and mother). The criterion cognitive variables will be college GPA and graduation during the four, five and six-year periods. The variables used are defined in Table 7 below.

Table 7

Variable and Participant Definitions for Ellen University of Pennsylvania

Variable	Definition
<u>Cognitive Predictor Variables</u>	
SAT	The Scholastic Aptitude Test (SAT) is one of the two major standardized college entrance tests taken in the United States today. The current SAT includes three sections, each of which can earn a maximum score of 800 and a minimum score of 200. Standardized tests like the SAT are designed to allow college admissions officers the opportunity to judge all students by a common standard of measure.
ACT	The American College Testing Assessment test (ACT) is one of the two major standardized college entrance tests taken in the United States today. Standardized tests like the ACT are designed to allow college admissions officers the opportunity to judge all students by a common standard of measure. The ACT tests knowledge in four subject areas: They are: English, Reading, Math, and Science Reasoning. The test has an overall maximum score of 36 and a minimum score of 1 a student can earn.
Advanced Placement Credit/ College Credit	Through Advanced Placement (AP) college-level courses and exams, students are able to earn college credit and advanced placement, prior to attending college. More than 30 courses and exams across multiple subject areas are offered in high schools nationwide. Coded as 1 for “no dual credit or AP credit” and 2 for “yes for dual credit or AP credit”.
High School GPA	A cumulative grade point average (GPA) earned by a student which includes grades 9 through 12. The students final GPA is

	determined during their senior year of high school.
High School Rank (%)	A ranking a student receives based on the number of students in his/her class/cohort. The students' final ranking is based on the students' cumulative grade point average earned and is determined during the students' senior year.
Rank of High School Index	Will be determined by using the public school rankings based on each school's performance data on state-wide standardized tests, which are implemented by the Department of Education for each state and retrieved from the PSK12.com website. The ranking of a high school will be adjusted to accommodate for the difference in the number of school districts in each state. This adjustment formula will be $\text{MAX-R} / \text{MAX-1}$ where MAX represents the total number of school districts in the state and R represents the ranking of the school district within that state. This will be represented by a percentile.
Weighted high school rank	Determined by rank of high school (percentile) multiplied by high school rank (percentile).
Square-rooted weighted high school rank	Determined by taking the square root of weighted high school rank. This is used to correct for skewed numbers for weighted high school rank.
<u>Non-cognitive Predictor Variables</u>	
Gender	Is defined as the sex of a person. For the purpose of this study, Male is coded as 1 and Female is coded as 2.
Race Code	The numeric value used by EU's Admissions Office for the purpose of identifying the race of students in the sample population. For the purpose of this study, African American is coded as 1 and White is coded as 0.
Family Structure	Defined by parental presence within the family. If parents are married or remarried, it will be coded as 1. If parents are single, widowed, divorced or separated, it will be coded as 2.
Parental Education	The level of education the parents within the family have achieved. The father and mother will each be assigned a code based on the highest level of education achieved. Junior High/Middle School or less will be coded as 1, High School Graduate will be coded as 2 and college and beyond will be coded as 3.
Parental Income	The adjusted gross income of the parents of students in the sample population used by EU's Financial Aid Office as a way of determining financial aid eligibility. Parental income will be coded as follows: \$0-\$10,000 coded as 0, \$10,001-\$20,000 coded as 1, \$20,001-\$30,000 coded as 2, \$30,001-\$40,000 coded as 3, \$40,001-\$50,000 coded as 4, \$50,001-\$60,000 coded as 5, \$60,001-\$70,000 coded as 6, \$70,001-\$80,000 coded as 7, \$80,001-\$90,000 coded as 8, \$90,001-\$100,000 coded as 9, \$100,001-\$110,000 coded as 10 and above \$110,000 coded as 11.
<u>Cognitive Criterion Variables</u>	
Collegiate GPA	The grade point average a student earns during his or her

	academic experience while enrolled in an undergraduate program. Because GPA was negatively skewed, each value was transformed by taking it to the 1.5 power (power transformed).
Graduation Status	Whether or not a student has graduated from EU in 4, 5 or 6 years from enrolling in the University. Graduating from EU will be coded either Yes (1) or No (0). Graduation status will be further coded based on number of years it took to graduate. Graduation in 4 years will be coded as 1, in 5 years will be coded as 2, in 6 years will be coded as 3, and in more than 6 years will be coded as 4.

Data Analysis

The data analysis was carried out using Stata Statistical Software 11.0 (2010). The research design used in this study is quantitative in nature within the post-positivist research paradigm. Several procedures were used to analyze the data in this study.

A multiple regression analysis with standardized regression coefficients (Mertens, 1998) was used to determine the relative contribution of each predictor variable for graduation status after the fourth, fifth and sixth or more years. A regression analysis was used to analyze graduation after the fourth, fifth, and sixth years and graduation in more than six years, by systematically adding and eliminating both cognitive and non-cognitive predictor variables. This was first completed for all students, both African American and White, and then run separately for the African American sample group and the White sample group to see if multicollinearity was at play.

The analysis began by investigating the relative outcome or ordering of the cognitive variables first for the African American sample population, and then for the White sample population. A similar analysis was completed using non-cognitive variables for each sample population separately. This form of research was selected since it fits the form of a predictive model.

In addition, Chi Square and T-Test Analysis were used to determine relationships and differences between African American and White students for variables including gender, father's education level, mother's education level, parental income level and SAT score (Mertens, 1998).

As mentioned in the data collection section of this chapter, parental income data for this study were not available prior to fall 1995. Therefore, the parental income variable will be eliminated for the analysis of the 1993 through 2003 sample population. There will be a separate multiple regression analysis and a separate regression analysis incorporating parental income completed for the sample group 1995 through 2003, to determine if the non-cognitive predictor variable of parental income serves as a strong predictor of student success in either of the sample populations.

Additionally, as mentioned earlier, parental education data for this study were not available prior to the fall of 1999. Therefore, the parental education variable will be eliminated for the analysis of the 1993 through 2003 sample population. There will be a separate multiple regression analysis and a separate regression analysis incorporating parental education completed for the same group 1999 through 2003, to determine if the non-cognitive predictor variable of parental education serves as a strong predictor of student success in either of the sample populations.

By comparing the cognitive and non-cognitive variables of both the African American and White sample populations, the outcome allows the determination of what set of variables best predict the academic success of African American students. The outcomes also allow the determination of the differences between African American and White students in terms of preadmission model predictors of persistence and graduation.

Researcher Positionality Statement

Given the national trend of research involving college admission and retention, and my professional involvement in Higher Education both in admissions and retention of students, I am concerned with further exploring the identification of effective predictors of African American students' academic achievement in college.

It is relevant to note that I am a first generation African American male with a Bachelor's degree and a Master's degree from institutions within PASSHE. I was raised in a nuclear family, which stressed the need not only to finish high school, but to further one's education beyond high school. Both of my parents had dropped out of high school in order to assist their single parents in raising their siblings. Because of their personal hardships, my parents adopted the philosophy of bettering one's self through education, which also motivated my younger brother to pursue an associate's degree from a community college and then a bachelor's degree from an institution within PASSHE. This philosophy has also carried through to both my brother and my children. My oldest daughter is an alumna of a PASSHE institution, and my younger daughter is finishing her degree, also at a PASSHE institution. In addition, my niece is pursuing a degree in higher education at a PASSHE institution and my nephew also plans to attend a PASSHE institution beginning fall 2011.

I have over twenty-three years of experience in undergraduate admissions, retention and academic support services. After earning a Master's degree, I began my career in college admissions where I served as Assistant Director of Admissions and Coordinator of Minority Student Recruitment at EU for a period of six years. Other responsibilities within the Admissions Department required me to review student athlete

applications and NCAA certification for eligibility to participate in the athlete's respective sport.

Following my role as Assistant Director of Admissions, I developed, and for twenty years directed, a large pre-college scholarship program for African American and Latino socio-economically disadvantaged students. This nationally recognized program involves a PASSHE institution, an urban school district and fourteen corporate partners, and encouraged African American and Latino students to not only finish high school, but to also pursue higher education. The corporate partners provided scholarship incentives for these students who attended a local public four-year institution.

Most recently, in addition to continuing my role as director of the pre-college program, I have served as the Assistant Vice President for Academic Services and Pre-Collegiate Programs for the past five years. This position also plays a key role in targeting best practices related to the retention of students of color at the institution.

Through these various experiences, I have recognized a legitimate need for and accountability of the retention of all students enrolled in higher education, but more specifically students of color. As with the trends across the country, I recognize that one of the most pressing problems within PASSHE is the retention and graduation of students, specifically students of color.

The purpose of this study is to develop a preadmission predictive model of student success for prospective first-time African American college applicants at a predominately White four-year public institution within PASSHE.

Summary

This chapter presented the procedures, the research questions, the hypotheses, the research design, the sampling, and the coding of the data used in this study. The data analysis techniques were also presented.

This chapter also described the cognitive and non-cognitive variables that were employed in this study. The research questions were designed to determine what combination of variables will best predict the academic success of African American freshmen, and whether there is a difference between African American and White students in terms of preadmission model predictors. The two main hypotheses leading to this research are that a significant relationship exists between the pre-collegiate data (predictor variables) and college success (criterion variables) for both student groups, and that a significant difference exists between African American and White students in terms of the model predictors.

The data analysis for this research was carried out using Stata Statistical Software 11.0 (2010). The research design used in this study is quantitative in nature within the post-positivist research paradigm. Several procedures were used to analyze the data in this study, including a multiple regression analysis with standardized regression coefficients, a regression analysis, and Chi-Square Tests and T-Tests.

By comparing the cognitive and non-cognitive variables of both the African American and White sample populations, the outcome allows the determination of what set of variables best predict the academic success of African American students. The outcomes also allow the determination of the differences between African American and White students in terms of preadmission model predictors of persistence and graduation.

CHAPTER IV: FINDINGS

Student Demographic Characteristics

The sample used in this study is comprised of 960 African American and 1,046 White full-time and first-time enrolled freshmen from the 1993 to 2003 fall cohorts at EU. The total sample population of 2,006 students represents freshmen offered regular admission or special admission at EU for the fall semesters described above. Students in these sample populations represent a wide spectrum of academic preparation, socio-economic backgrounds, family structure and parental education.

While the African American sample represents intact cohort groups, a similar number of White students from the same freshmen cohort groups were randomly selected. This sample selection was completed with the assistance of the Office of Institutional Research at EU. EU is one of the oldest of the fourteen state-owned institutions of higher education within the PASSHE system, which is known for its teacher education and liberal arts. EU is a comprehensive public institution which provides exemplary undergraduate and graduate programs. The majority of the incoming students come from a 16 county area within Pennsylvania and also New Jersey, Delaware and Maryland.

Traditionally the first-time freshmen recruited each year during the time frame of the study number approximately 1,300 students with 10% of the student body being African American and 3.8% Latino. The majority of the African American student population is recruited from Philadelphia and the surrounding areas.

Bivariate Analyses

As shown in Table 8 below, a statistically significant relationship exists between race and the number of years it takes to graduate. A cross tabulation was run for the 2,006 students in the sample group over a ten year period. This was used to determine how graduation rates for African American students compared to those for White students in four, five and six or more years. During this time period, more African American than White students dropped out of EU; 54.0% of African American students versus 32.6% of White students. Fewer African American students (14.9%) graduated in four years than White students (38.6%), a difference of 23.7%. When comparing five year graduation rates, about the same number of African American and White students graduated in five years; 21.8% of African American students compared to 23.7% of White students. More African American students (6.3%) took six years to graduate than White students (3.5%). Lastly, it should be noted that 3.1% of African American students compared to 1.5% of White students graduated in seven or more years.

Table 8

Cross-tabulation of Graduation in Four, Five, Six and Six or More Years

Race	withdrawal	No. Yrs to Grad				Total
		4yr	5yr	6yr	7+yr	
White	341	404	248	37	16	1,046
Afr. Am	518	143	209	60	30	960
Total	859	547	457	97	46	2,006

Pearson chi2(4) = 170.6766 Pr = 0.000

As Table 9 below shows, no statistical significance exists between gender and race. However, when comparing gender as it relates to enrollment at EU over this time period, and using the same sample of 2,006 students, more females than males have

enrolled in EU, regardless of race. The White student sample is comprised of 59.8% female and 40.2% male students. Similarly, the African American student sample is comprised of 59.4% female and 40.6% male students. Across both races, the female sample population makes up 59.6% while the male sample population makes up only 40.4%, a disparity of 19.2%.

Table 9

Comparison of Gender for Sample Group, African American and Whites Attending EU

Race	Gender		Total
	male	female	
White	421	625	1,046
African American	390	570	960
Total	811	1,195	2,006

Pearson chi2(1) = 0.0295 Pr = 0.864

A statistically significant relationship exists between father's education and graduation. Table 10 below shows a cross tabulation of African American and White student population of father's level of education completed. The three levels are middle school or less, high school graduate, and college or beyond. It is shown that more African American fathers have failed to complete high school or completed no more than middle school than their White counterparts. For the 808 students that we have available data (due to lack of availability on the FAFSA form prior to 1999), 7.8% of African American fathers failed to complete high school or had no more than a middle school education, while only 3.4% of White fathers fell into the same category. Fewer White fathers (51.1%) than African American fathers (64.1%) reported graduation from high school as their highest level of education on the FAFSA form. Lastly, 28.2% of African American

fathers reported college or more education and 45.5% of White fathers reported college or more education. This represents a significant disparity of 17.3%.

Table 10

Comparison of Father's Education Level for African American and White Students

Race	Father's Education			Total
	middle school	high school	college	
White	15	228	203	446
African American	28	232	102	362
Total	43	460	305	808

Pearson chi2(2) = 28.9916 Pr = 0.000

There is also a statistically significant relationship between mother's education and graduation. Table 11 below shows a cross tabulation of mother's level of education completed for African American and White student populations. More African American mothers have failed to complete high school or completed no more than middle school when compared to their White counterparts. For the 866 students that we have available data (due to lack of availability on the FAFSA form prior to 1999), 4.7% of African American mothers failed to complete high school or had no more than a middle school education, while only 1.4% of White mothers fell into the same category. Fewer White mothers (53.8%) than African American mothers (58.7%) reported graduation from high school as their highest level of education on the FAFSA form. Lastly, 36.6% of African American mothers reported college or more while 44.8% of White mothers reported college or more. This represents a disparity of 8.2%.

Table 11

Comparison of Mother's Education Level for African American and White Students

Race	Mother's Educ			Total
	middle school	high school	college	
White	6	238	198	442
African American	20	249	155	424
Total	26	487	353	866

Pearson chi2(2) = 12.6562 Pr = 0.002

There is a statistically significant relationship between race and parental income. In order to discuss this data, twelve income ranges were combined into three categories; 0 to \$30,000, \$30,001 to \$70,000 and \$70,001 and above. As reflected in Table 12, 53.3% of African American parental income levels fall in the lowest category, \$0 to \$30,000, whereas only 25.6% of White parental income levels fall in the same category. Only 14.7% of African American parental income levels fall in the highest category, \$70,001 and above, as compared to 41.9% of White parental income levels.

Table 12

Comparison of Parental Income Levels by \$10,000 Increments for Both Races

income range by \$10K	Race		Total
	White	Afr. Am	
0	105	117	222
1	25	86	111
2	34	98	132
3	44	115	159
4	38	103	141
5	65	54	119
6	67	53	120
7	93	39	132
8	69	33	102
9	70	25	95
10	61	19	80
11	140	38	178
Total	811	780	1,591

Pearson chi2(11) = 265.6294 Pr = 0.000

Table 14

Multivariate analyses variable definitions

Variable	Abbreviated Name	Definition
<i>Criterion Variables</i>		
Transformed Collegiate GPA	t_gpa_1p5	Student's college grade point average (GPA) transformed by taking GPA to the 1.5 power
Graduated from College	grad	A dummy variable coded as graduated within six years=1 and dropped=0.
<i>Cognitive Predictor Variables</i>		
Scholastic Aptitude Test	sat	The Scholastic Aptitude Test (SAT) score for students entering college
Advanced Placement or Dual Enrollment Credit	ap_dual_credit~n	College credit and advanced placement credit prior to attending college coded as 1=no credit and 2=credit
Square-rooted weighted high school rank	sqrt_wtrnk	The square root of weighted high school rank
<i>Non-cognitive Predictor Variables</i>		
Gender	gender	Coded as 1=male and 2=female
Race Code	aa_01	Identifies student race and coded as 1=African American and 0=White.
Family	family	Defined by parental presence within the family. If parents are married or remarried, it will be coded as 1. If parents are single, widowed, divorced or separated, it will be coded as 2.
Parental Education	mother_ed	Mother's level of education coded as 1=less than high school graduate; 2=high school graduate; and 3=college plus
	father_ed	Mother's level of education coded as 1=less than high school graduate; 2=high school graduate; and 3=college plus
Parental Income	inc_range10	Parents' adjusted gross income coded as follows: \$0-\$10,000 coded as 0, \$10,001-\$20,000 coded as 1, \$20,001-\$30,000 coded as 2, \$30,001-\$40,000 coded as 3, \$40,001-\$50,000 coded as 4, \$50,001-\$60,000 coded as 5, \$60,001-\$70,000 coded as 6, \$70,001-\$80,000 coded as 7, \$80,001-\$90,000 coded as 8, \$90,001-\$100,000 coded as 9, \$100,001-\$110,000 coded as 10 and above \$110,000 coded as 11.

Differentiating Between Races

The initial OLS multiple regression included both races using a dummy variable (aa_01 where White=0 and African American=1). Variance inflation factors computed for this model showed evidence of severe multicollinearity, which undermines an important assumption for OLS models (Hamilton, 1992). In an attempt to reduce the effects of multicollinearity, exogenous variables were dropped from the model including SAT scores, weighted high school rank, and income. Dropping these variables, which theoretically relate to the prediction of college GPA and graduation, simply in order to treat every racial group the same, does not appear reasonable. Nonetheless, retaining all of the variables resulted in an inability to meet OLS regression assumptions. To further complicate matters, the dependent variable, college GPA, was negatively skewed. This problem, however, was eliminated by using power transformations as suggested by Hamilton (1992). The final transformed variable for college GPA, t_gpa_1p5, took college GPA to the 1.5 power. The reduced variable model with a transformed DV is shown in Table 15 below.

Table 15

Linear Regression Output Incorporating African American and White Students

Linear regression		Number of obs =		699		
		F(6, 692) =		33.55		
		Prob > F =		0.0000		
		R-squared =		0.2104		
		Root MSE =		1.6943		
t_gpa_1p5	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
family	-.4604996	.1506513	-3.06	0.002	-.7562881	-.164711
mother_ed	-.043992	.1295027	-0.34	0.734	-.2982573	.2102733
father_ed	.3894729	.1342488	2.90	0.004	.1258891	.6530568
ap_dual_cr~n	.6114209	.21322	2.87	0.004	.1927851	1.030057
gender	.8035088	.1300718	6.18	0.000	.5481261	1.058891
aa_01	-1.009348	.1454141	-6.94	0.000	-1.294853	-.7238421
_cons	2.566152	.5374202	4.77	0.000	1.510982	3.621322

When looking at Table 15 above, it is clear that a significant difference exists between African American and White students in terms of college GPA. This indicates the two groups come from different populations thereby suggesting that a separate model might be fit for each group. When separate models were developed for each race, the significant predictors for White students differed from the significant predictors for African American students. This provided further justification for running separate prediction equations for the two races. As hypothesized, predictors of college GPA for a population of White students differ from the predictors of college GPA for a population of African American students. Therefore, when using admissions data to predict college GPA for these two populations, admissions personnel might wish to consider different predictor variables. The following multivariate analyses explore these prediction differences across two models; one for African American students and one for White students.

Exploring Admission Predictors for White and African American Students

Both college GPA and college graduation were used as dependent variables. First, OLS regressions were used to explore predictors for college GPA. Then logistic regression was used to explore predictors for graduation, where the DV was coded as graduation equaled one and dropping out or not graduating within six years equaled zero.

Predicting college GPA. The initial OLS regressions showed evidence of heteroskedasticity in their residual versus fitted plots and signs of leveraging based on leverage versus residual squared plots. Univariate exploratory data analyses were conducted on the model variables. As noted above, the DV was transformed by the power of 1.5 in order to correct a slight negative skew. The weighted high school rank had a

severe positive skew that was corrected by taking the variable to the power of 0.5, and is noted in the model as sqrt_wtrnk. These corrections resulted in “all clear” residual versus predicted values plots and indicated no pertinent leveraging. The family variable, defined as independent, parent single, or parent married, was reduced to single and married given that students were independent in only seven out of 825 reported cases. Then, by using one model for White students and one for African American students, multicollinearity was no longer a problem and the OLS regression models were deemed to meet the necessary underlying assumptions.

As shown in Table 16 below, when the multiple regression was run for White students only, the significant predictor variables of college GPA were weighted rank, family, father’s education and gender. These four predictor variables all had probability values less than $\alpha=.05$.

Table 16

Linear Regression Showing Predictor Variables for College GPA of White Students at EU

Source	SS	df	MS	Number of obs = 387		
Model	267.010719	8	33.3763399	F(8, 378)	=	12.91
Residual	977.321183	378	2.58550578	Prob > F	=	0.0000
				R-squared	=	0.2146
				Adj R-squared	=	0.1980
				Root MSE	=	1.608

t_gpa_lp5	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
sat	-.0005818	.0007833	-0.74	0.458	-.0021219	.0009583
sqrt_wtrnk	4.966865	.6700609	7.41	0.000	3.649351	6.284378
family	-.5346128	.2617224	-2.04	0.042	-1.049227	-.0199985
mother_ed	-.0833244	.17202	-0.48	0.628	-.4215605	.2549116
father_ed	.3824603	.1627388	2.35	0.019	.0624736	.702447
inc_range10	.0055979	.0352201	0.16	0.874	-.063654	.0748497
ap_dual_cr~n	.202319	.2459644	0.82	0.411	-.2813109	.6859489
gender	.5310938	.1715631	3.10	0.002	.1937562	.8684315
_cons	.9025644	1.046908	0.86	0.389	-1.155928	2.961057

As shown in Table 17 below, when the regression was run for African American students only, the significant predictor variables of college GPA were SAT score, weighted rank, parental income and gender. These four predictor variables all had probability values less than $\alpha=.05$.

Table 17

Linear Regression of Predictor Variables for College GPA of African American Students

Source	SS	df	MS			
Model	171.122591	8	21.3903239	Number of obs =	271	
Residual	619.489592	262	2.36446409	F(8, 262) =	9.05	
Total	790.612184	270	2.92819327	Prob > F =	0.0000	
				R-squared =	0.2164	
				Adj R-squared =	0.1925	
				Root MSE =	1.5377	

t_gpa_lp5	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
sat	.0015099	.0006924	2.18	0.030	.0001466	.0028733
sqrt_wtrnk	2.267363	.641964	3.53	0.000	1.003297	3.531428
family	.2834022	.2328816	1.22	0.225	-.1751557	.7419601
mother_ed	-.0656227	.177398	-0.37	0.712	-.4149299	.2836845
father_ed	.1665949	.1816409	0.92	0.360	-.1910668	.5242566
inc_range10	.0914119	.0365658	2.50	0.013	.0194116	.1634122
ap_dual_cr~n	.3397661	.5335691	0.64	0.525	-.7108632	1.390395
gender	.69385	.1931113	3.59	0.000	.3136023	1.074098
_cons	-1.353814	1.03618	-1.31	0.193	-3.394114	.6864862

For both races, the regression showed that when controlling for the other variables weighted rank has a positive relationship with college GPA such that as weighted high school rank increases, GPA increases. Figures 7 and 8 show conditional effects plots for weighted rank and college GPA for each regression. These plots depict the original units of college GPA and weighted rank by taking the predicted transformed college GPA to the power of $(1 \div 1.5)$ and plotting over the original units of weighted high school rank. Figure 9 then shows how high school rank differs in terms of predicting college GPA among Whites and African Americans by plotting both regression outputs on the same graph, which shows a comparison using equal scales. As can be seen, at lower levels of weighted high school rank, African American students will have higher college GPA

predictions than White students. As weighted high school rank increases, however, White students predict higher college GPA.

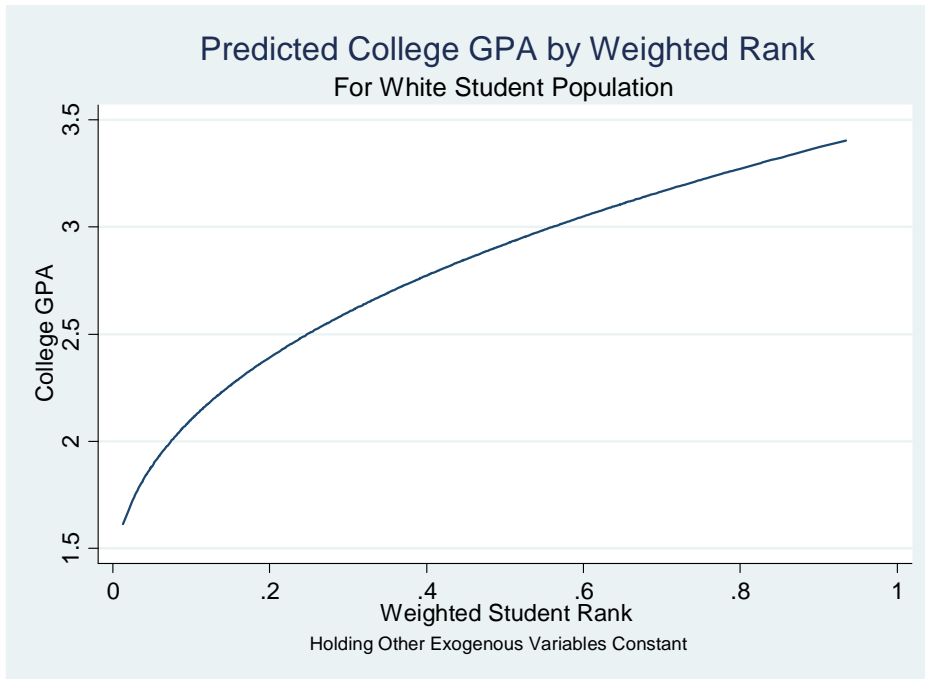


Figure 7. Weighted high school rank and predicted GPA for White students.

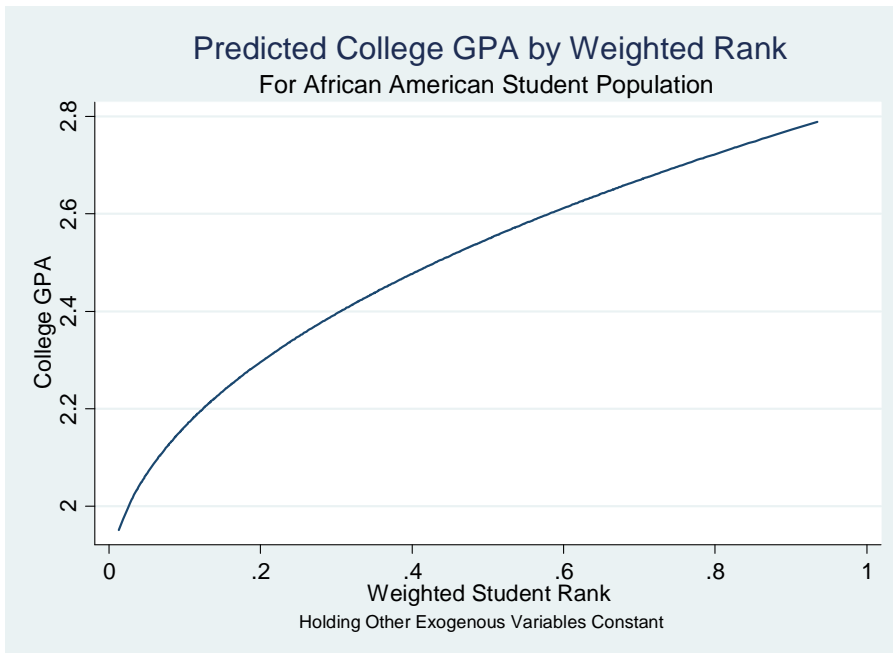


Figure 8. Weighted high school rank and predicted GPA for African American students.

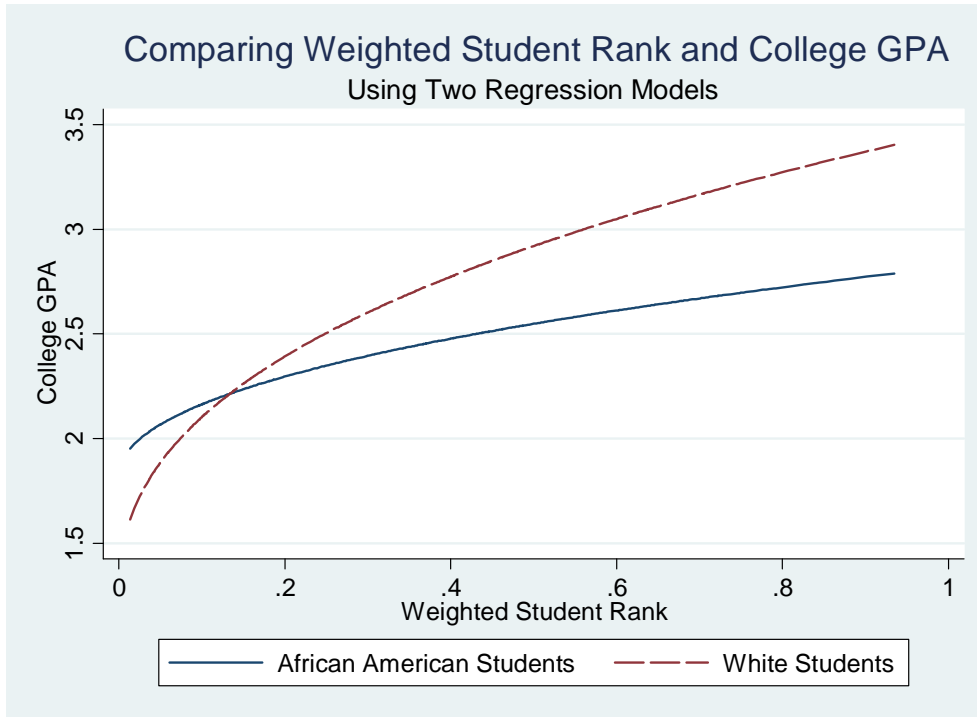


Figure 9. Comparing White and African American student prediction models.

Similar to weighted high school rank, gender is significant in both models. Females have higher GPAs irrespective of the other variables. Figures 10 and 11 provide conditional effects plots depicting this outcome in terms of weighted high school rank. For both Whites and African American students, at every level of weighted high school rank females have a higher predicted GPA than males. Comparing the two graphs shows a greater disparity between African American male and female predicted GPAs than between White male and female predicted GPAs.

For African Americans only, SAT scores have a positive relationship with predicted college GPA. Figure 12 highlights this relationship by gender. African American females, at all levels of SAT score have higher predicted college GPAs than African American males.

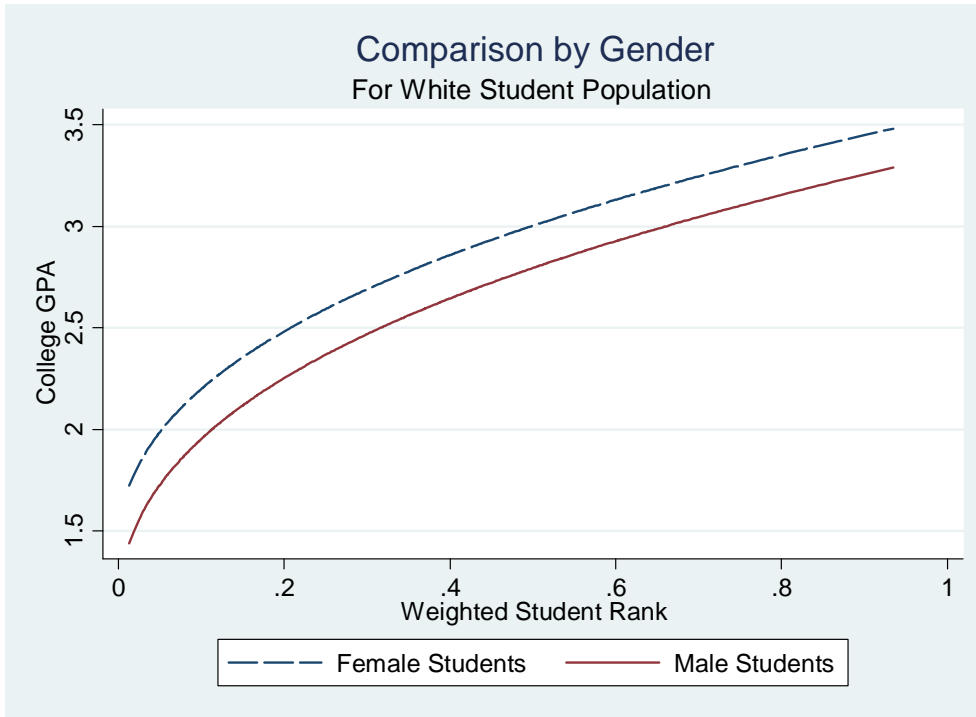


Figure 10. White gender differences in predicted college GPA over high school rank.

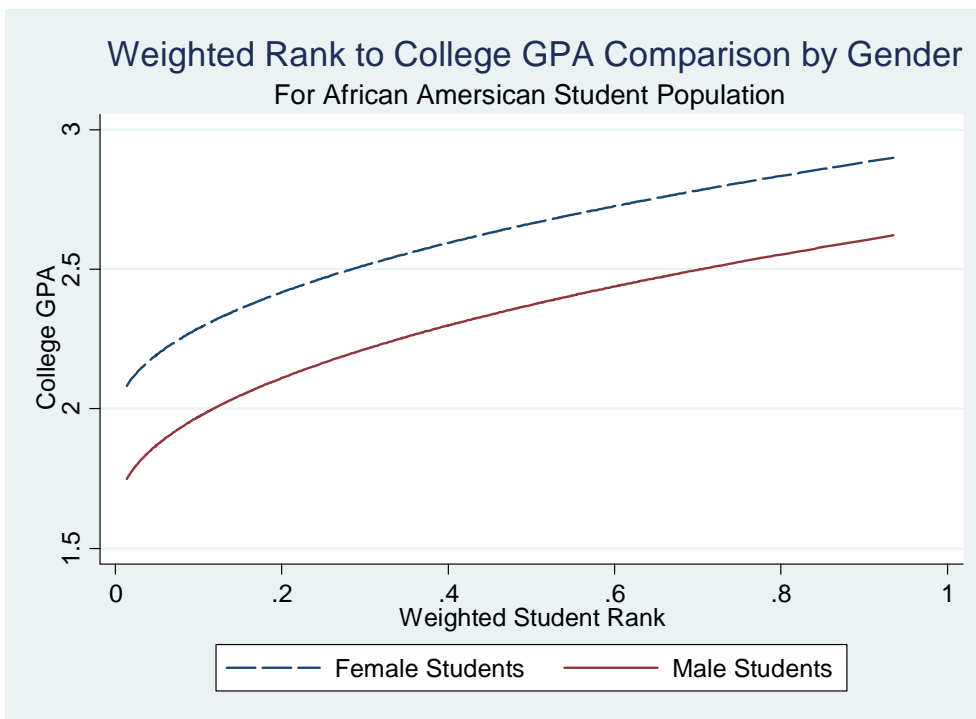


Figure 11. African American differences in predicted college GPA over high school rank.

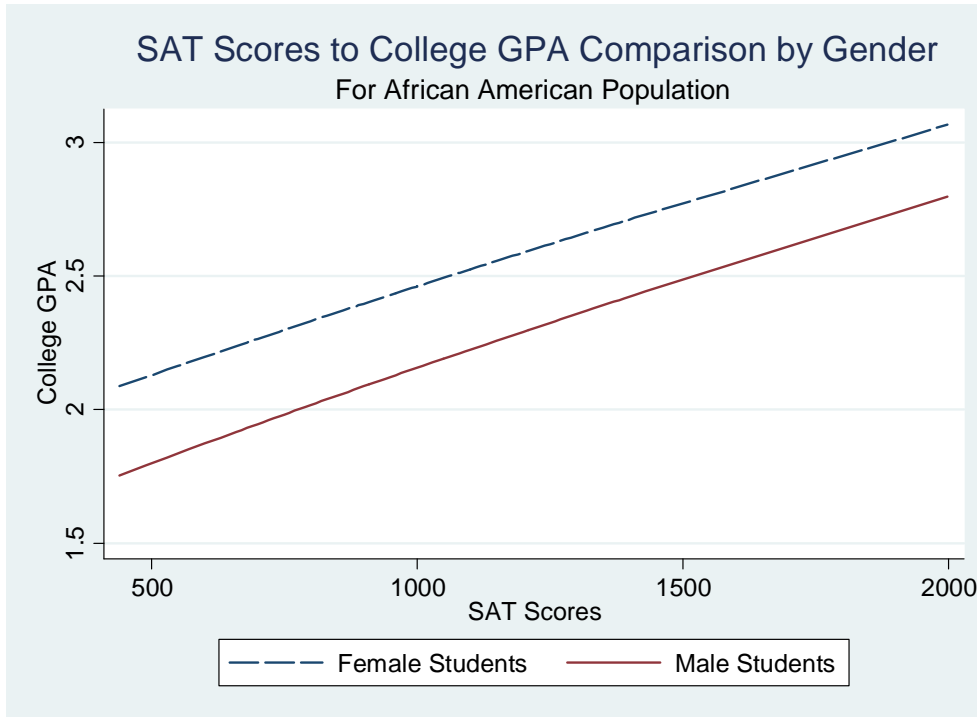


Figure 12. African American gender differences in college GPA across SAT scores.

Other prediction differences exist between the two models. For example, family structure predicts college GPA for White students, but not for African American students. With family coded as one married and two single, the negative relationship indicates that all things being equal White students with married parents have higher college GPAs. Similarly, father's education level predicts college GPA for White students, but not for African Americans. Figure 13 provides a picture of father's education level relative to weighted high school rank. At all levels of rank, the higher a father's education level the higher the predicted college GPA. The three levels of father's education remain about equal distant from each other indicating equal jumps in predicted GPA between education categories at every level of weighted high school rank and irrespective of the other predictor variables.

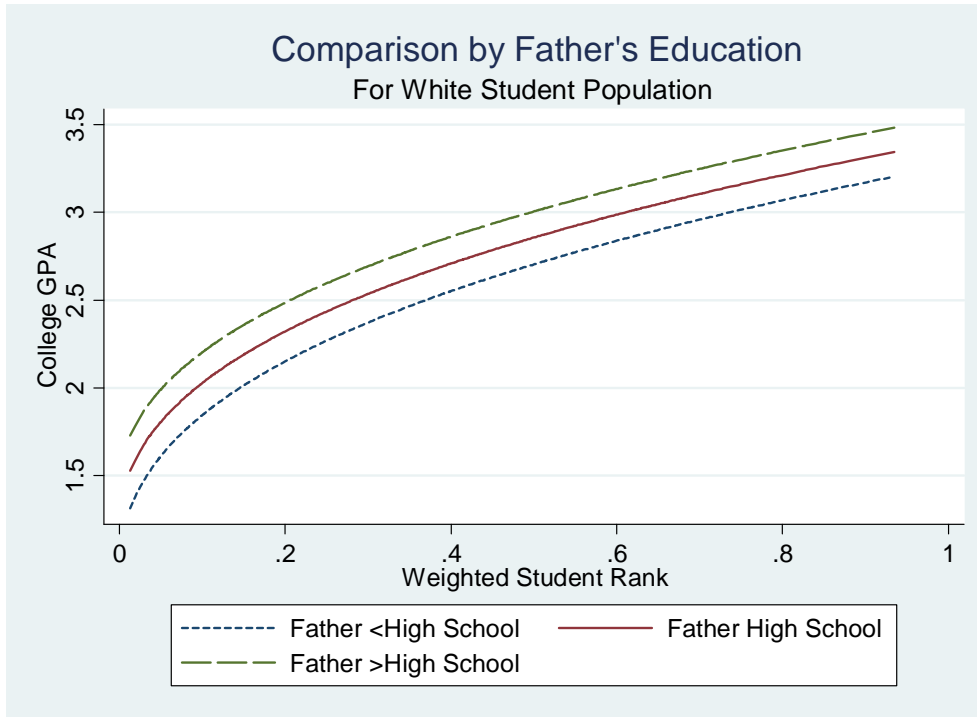


Figure 13. Father's education differences for White students.

The final difference between the White student model predictors and the African American model predictors rests with parental income. As the African American students' parental income increases their predicted college GPA's increase irrespective of the other predictor variables. This is not the case for White students, where income does not have a significant effect. Figure 14 shows the relationship between parental income and predicted college GPA for African American students.

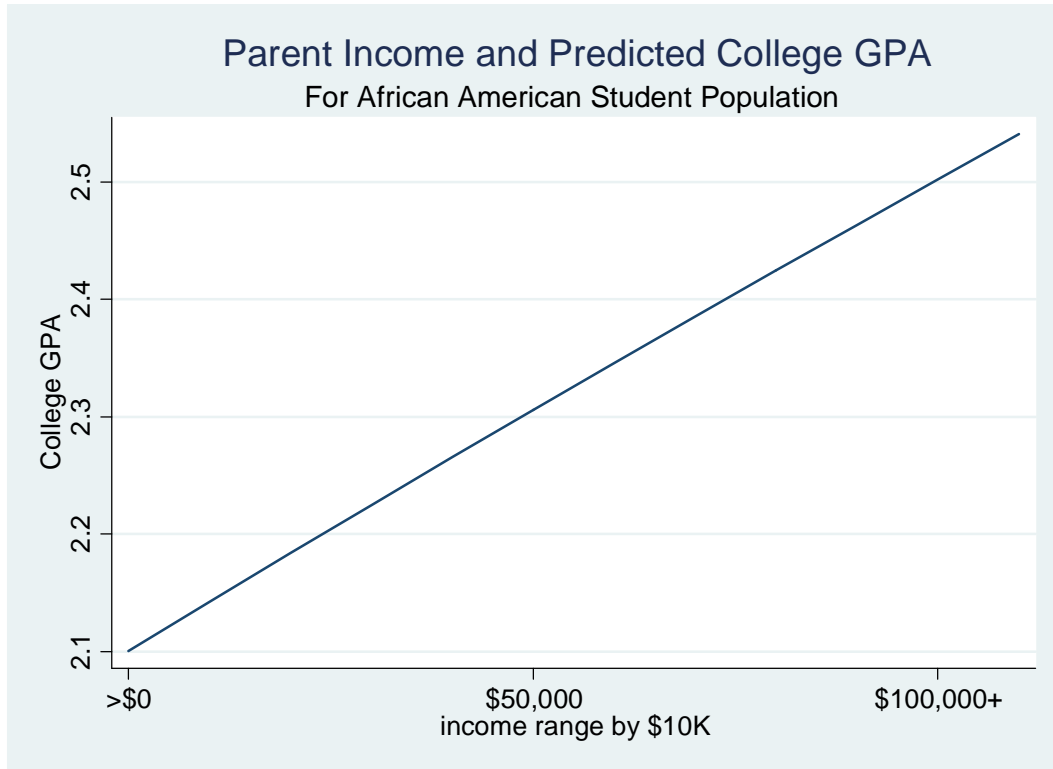


Figure 14. Parental income and predicted college GPA for African American Students.

Predicting college graduation. A separate logistic regression analysis was also run for each race to predict graduation from EU. As shown in Tables 18 and 19 below, the logistic regressions produced very low pseudo R^2 values: .06 for White students and .10 for African American students. While neither model was significant on the Hosmer-Lemeshow goodness of fit test indicating the models were satisfactorily fit, both models poorly predicted graduation and no-graduation with only 64% correct predictions for the African American model and 65% for White students. Similarly, the area under the ROC curve for the African American model was .71 and the area under the ROC curve for the White student model was .65. Hence, while the models were significant and indicated significant predictors, the estimated variability explained by the models remains low.

Table 18

Logistic Regression Showing Predictor Variables for Graduation from EU of White

Students

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Logistic regression                               Number of obs   =       387
                                                  LR chi2(8)      =       28.74
                                                  Prob > chi2     =       0.0004
Log likelihood = -238.8931                       Pseudo R2      =       0.0567
    
```

	grad	Odds Ratio	Std. Err.	z	P> z	[95% Conf. Interval]
sat		.9981994	.0010667	-1.69	0.092	.996111 1.000292
sqrt_wtrnk		15.27218	13.77077	3.02	0.003	2.608442 89.41712
family		.6306727	.2123355	-1.37	0.171	.3260023 1.220077
father_ed		1.63201	.3590196	2.23	0.026	1.060401 2.511744
mother_ed		.7860505	.1831325	-1.03	0.301	.4978966 1.240971
inc_range10		1.043089	.0488033	0.90	0.367	.9516905 1.143264
ap_dual_cr~n		2.209467	.8122708	2.16	0.031	1.074876 4.541679
gender		.9079675	.2099365	-0.42	0.676	.5771105 1.428505

Table 19

Logistic regression showing predictor variables for graduation from EU of African

American students

```

Logistic regression                               Number of obs   =       271
                                                  LR chi2(8)      =       38.97
                                                  Prob > chi2     =       0.0000
Log likelihood = -167.20335                       Pseudo R2      =       0.1044
    
```

	grad	Odds Ratio	Std. Err.	z	P> z	[95% Conf. Interval]
sat		1.001254	.0010144	1.24	0.216	.9992672 1.003244
sqrt_wtrnk		3.808641	3.459305	1.47	0.141	.6421585 22.58904
family		1.330026	.443089	0.86	0.392	.6922901 2.555242
father_ed		2.11971	.5604915	2.84	0.004	1.262416 3.559182
mother_ed		.7319707	.181926	-1.26	0.209	.4497112 1.191389
inc_range10		1.094336	.0570907	1.73	0.084	.9879706 1.212152
ap_dual_cr~n		1.278854	.9713854	0.32	0.746	.2885824 5.667249
gender		2.544684	.6961399	3.41	0.001	1.488586 4.350047

Although the logistic models are relatively weak, the results suggest some general ideas that could use further study. Table 18 suggests that all things being equal, for White students positive relationships exist between high school rank and graduation (the higher

the rank the greater the odds of graduating), father's education and graduation (the higher the father's education the greater the odds of graduating), and AP credits and graduation (the odds of graduating are higher for students coming in with AP credits). Similarly, Table 17 suggests that all things being equal, for African American students positive relationships exist between father's education and graduation (as father's education increases the odds of graduating increases) and between gender and graduation (the odds of graduating are higher for African American females than males).

Chapter Conclusion

There are major differences between African American student populations and White student populations. These differences suggest that colleges and universities should consider developing separate predictive models when using preadmission variables to predict college GPA and graduation. The regression models used in this study provide valuable insights into predicting success in college. In particular, when trying to predict college GPA, lower high school ranks weighted according to state school rankings seem less detrimental for African American students than for White students. Part of this may be simply a function of environmental and demographic factors.

While moderate prediction strength was found when using preadmission variables in an OLS regression model to predict college GPA, minimal predictive strength was found when using preadmission variables in a logistic regression model to predict graduation. When college GPA was added to the logistic regression equations, however, the pseudo R^2 values increased remarkably yielding .39 for White students and .52 for African American students. All of this seems to indicate that preadmission variables can moderately predict college GPA, and since college GPA moderately predicts graduation,

other factors must strongly effect graduation. This unmeasured variance presumably made the preadmission variables used in this study unable to yield even moderately powerful predictions.

Finally, using a single model incorporating both African American and White students, although possible to craft, generated a poorly specified model yielding questionable results. When considering African American and White students as separate and distinct populations, the models yielded differing effects that more accurately depicted the uniqueness of the populations. The preadmission variables used in this study moderately predicted college GPA for both student populations.

CHAPTER V: DISCUSSION AND CONCLUSIONS

Summary

The purpose of this study was to develop a preadmission predictive model of student success for prospective first-time African American college applicants at a predominately White four-year public institution within PASSHE. This study explored the use of two types of variables; (a) cognitive variables (i.e., SAT score, ACT score, high school GPA, weighted rank (incorporating ranking of high school and students' high school rank), advance placement/college credit) and (b) non-cognitive variables (i.e., gender, race, family structure, parental income, and parental education). These cognitive and non-cognitive variables have been used with both African American and White college-bound students as a way of predicting their persistence and graduation at a four-year PWCU within the PASSHE.

This study employed linear multiple regression analyses using the following predictor variables: parental income, parental income, family structure, SAT score, weighted rank and high school GPA. The criterion variables were the students' cumulative GPA while attending EU, and the percent of those students in the sample population that graduated from the institution within four, five, six and more than six years. The study was directed by four research questions. Each research question and the relevant outcomes will be examined in detail below. The questions were explored using linear multiple regression and logistic regression and are summarized below.

RQ 1: Can the overall academic success of African American freshmen be predicted on the basis of preadmission variables? This study used two cognitive criterion variables to measure academic success. The first criterion variable, college GPA, relates

to student academic success while enrolled at EU. The bivariate and multivariate analyses revealed that some preadmission predictor variables could moderately predict college GPA. The second criterion variable was graduation from EU in four, five, six or more than six years. The analyses revealed that the preadmission predictor variables could only predict graduation from EU poorly. In fact, the resulting models were only correct in predicting graduation for 64% of the African American students and 65% of the White students in the sample population. Therefore, the estimated variability explained by the models remains low and additional research is needed to determine the underlying issues related to high attrition rates among African American students.

RQ 2: Which variables significantly predict the academic success of African American students? Through the use of multiple regression analysis, certain variables were shown to be more significant predictors of college GPA than others. Table 20 below lists the significant variables for each of the two student populations. To be considered statistically significant, the results need to be $p > \alpha = .05$. Four variables were found to be significant predictors of college GPA for each group, however, they were not all the same variables.

Table 20

Significant and Non-significant Predictors for College GPA at EU

Predictor Variables	Type	White Pop Results At $p > \alpha = .05$	AA Pop Results At $p > \alpha = .05$
SAT	Cognitive	Not Significant	Significant
Weighted Rank	Cognitive	Significant	Significant
Family	Non-Cognitive	Significant	Not Significant
Mother's Education	Non-Cognitive	Not Significant	Not Significant
Father's Education	Non-Cognitive	Significant	Not Significant
Parental Income	Non-Cognitive	Not Significant	Significant
AP/College Credit	Cognitive	Not Significant	Not Significant
Gender	Non-Cognitive	Significant	Significant

RQ 3: What set of variables will best predict the academic success of African American Freshmen? Table 21 below shows the significant and non-significant predictor variables for graduation from EU within four, five, six and more than six years. It is important to note that even the variables noted as “significant” only poorly predicted graduation from EU. The logistic regressions produced very low pseudo R² values yielding .06 for White students and .10 for African American students.

Table 21

Significant and Non-significant Predictors for Graduation (yes/no) from EU

Predictor Variables	Type	White Pop Results At $p > \alpha = .05$	AA Pop Results At $p > \alpha = .05$
SAT	Cognitive	Not Significant	Not Significant
Weighted Rank	Cognitive	Significant	Not Significant
Family	Non-Cognitive	Not Significant	Not Significant
Mother’s Education	Non-Cognitive	Not Significant	Not Significant
Father’s Education	Non-Cognitive	Significant	Significant
Income	Non-Cognitive	Not Significant	Not Significant
AP/College Credit	Cognitive	Significant	Not Significant
Gender	Non-Cognitive	Not Significant	Significant

RQ 4: Is there a difference between African American and White students in terms of preadmission model predictors? The initial regression model incorporating a dummy race variable (where: 0=White and 1=African American) showed that significant differences existed between the two student populations. This is not surprising given the drastically different student demographics between the two student populations, particularly the difference in parental education and parental income. As outlined in Chapter IV, due to the existence of multicollinearity, which undermined an important assumption for OLS models, analyses were run separately for each race category to allow for reasonable prediction strength. Treating each race as a distinct population provided the opportunity to develop unique models for exploring how different variables were

statistically significant in predicting college GPA and graduation from EU for each of the two student populations.

As shown in Table 20 above, the significant predictors of student success at EU (measured in terms of collegiate GPA) for African American students included SAT score, weighted rank, parental income, and gender. These represent a mix of cognitive and non-cognitive variables. For White students, the significant predictor variables for college GPA included weighted rank, family, father's education and gender, which is also a mix of cognitive and non-cognitive variables.

As illustrated in Table 20 above, there are only two significant predictor variables shared between the two populations; gender and weighted rank. However, each one provided slightly different prediction lines. From an admissions perspective, because college GPA for the two populations were predicted by different variables, any preadmission predictor model used by college admissions offices must treat the two populations differently. A model used to predict college GPA for African American students should involve consideration for including weighted rank, parental income and SAT score. Although most colleges do consider rank and SAT score in their admissions decisions, the addition of the weighted rank and parental income variables should increase the prediction strength. This information would be useful in determining students "at risk" of falling behind at college and in need of supports and interventions.

In terms of predicting graduation, father's education was the only predictor variable that was significant for both populations. Table 21 shows that for the African American population at EU, while cognitive variables (SAT, weighted rank, and AP/College credit) were useful in predicting college GPA, they do not predict college

graduation. Clearly, the retention of African American students in particular is a complex issue that can not be predicted nor addressed purely in terms of such cognitive variables. Additional research is needed to determine the major contributing factors to the high rate of African American attrition. Factors to be considered might include those identified by the theorists Spady (1970), Tinto (1975), Bean (1980) and Pascarella and Terenzini (1980) in Chapter II which included academic and social integration and outside societal pressure. The data presented in this study does not allow for the creation of a model that can reasonably predict college graduation based on the preadmission variables used.

This study had two general hypotheses:

- 1) A significant relationship exists between the pre-collegiate data (predictor variables) and college GPA and graduation for both student groups.

The data suggest that a significant relationship does exist between the pre-collegiate data (both non-cognitive and cognitive predictor variables) and college GPA and college graduation for both student populations. The statistically significant predictor variables moderately predicted college GPA for both populations. However, the variables weakly predicted graduation from EU indicating that additional factors contribute to a student's graduation or decision to depart from EU.

- 2) A significant difference exists between African American and White student populations suggesting a need for separate predictor models that will yield differing sets of significant predictor.

The data suggest that a significant difference does exist between African American and White students, which ultimately translates into which variables are significant predictors of college GPA and graduation, however, some similarities do

exist. In terms of student success, defined as college GPA while enrolled at EU, both African American and White student success was predicted by weighted rank and gender. Regardless of race, as weighted rank increased, so did college GPA. This is consistent with Tinto's Student Integration Model (1975) which suggests that all students enter their college or university with particular characteristics which combine to influence student success in college. These characteristics include individual attributes, (e.g., gender and age) and pre-college educational performance experiences, (e.g., high school grades, weighted rank, SAT/ACT scores).

Also regardless of race, female students had higher college GPAs, however, there was a greater disparity between African American male students and African American female students than between White male students and White female students. The data also show that more females than males, regardless of race, are enrolled in EU, which is consistent with national statistics. For the time period used in this study, 59.6% of the students were female. Broken down by race, 59.8% of white students were female and 59.4% of African American students were female. The lack of male participation in higher education may be related to some of the challenges facing young men which may begin as early as elementary school and continue through their secondary and post-secondary experiences. Males have lower literacy scores than females and are less likely than females to participate in non-athletic extra-curricular activities which are appealing to college admissions officers (Weaver-Hightower, 2010). Further, males are taking fewer college preparation courses and fewer are graduating from high school. This study reflects similar findings by showing increased college success for both White and African

American females versus males and greater college graduation for African American females over males.

The SAT score was not statistically significant in predicting college GPA for White students. This variable is one of the most commonly used by admissions offices in making admissions decisions. The results of this study suggest that EU might be well served in limiting the emphasis placed on SAT scores for White students and instead consider the other more statistically significant variables such as family structure and father's education. Conversely, SAT scores did significantly predict African American student success. It appears that this difference is due to the greater variability found in the distribution of African American SAT scores and that African Americans have significantly lower SAT scores than Whites.

While family structure influenced the college GPA of White students (White students with married parents had higher GPAs than White students with single parents), this was not the case for African American students. This difference clearly illustrates the need for different models to be used for predicting college GPA for the different populations. Family structures and male female roles in African American families differ from White families, which may partially explain these results.

The data collected at EU was somewhat limited in terms of non-cognitive variables. While further research is needed to identify additional variables that may not have been accounted for in this study, results do indicate the practical significance for including non-cognitive variables into admissions decisions.

In addition to the aforementioned findings, several other observations relevant to this study were made based on the data used. The data showed that at EU African

American students do drop out at a greater rate than White students, which is consistent with nation-wide data. Some reasons for this disparity include the quality of education that African Americans are obtaining at the high school level and the fact that many African American students reside in urban settings which do not typically promote quality education due to funding restrictions at the state, federal and city levels (CSRDE, 2006-2007). Additionally, many African American students are from low income families with low levels of parental education. For a large percentage of African American students, reading and math achievement scores have lagged behind those of White students. When comparing White and African American student prediction models on Figure 9 in the results chapter, lower African American weighted ranks actually predict higher college GPAs than lower weighted ranks for White students. This reinforces the notion that two separate predictor models are necessary in order to predict student success for each of these races, and that weighted rank, while a good predictor for both Whites and African Americans, must be viewed differently between the two groups particularly at lower and higher weighted ranks. More college successful African Americans, in contrast with the White population of students attending EU, simply come from more poorly ranked schools.

In terms of graduation, a statistically significant relationship exists between race and number of years to graduation. African Americans graduate at a lower rate than White students in four years, graduate at about the same rate as White students in five years, and graduate at a greater rate than White students in six and seven years. There are many contributing factors to this trend. According to Tinto's theory of student attrition (1993), student departure from post-secondary institutions cannot be viewed as an

individual phenomenon, but rather as one that relates to the student's pre-college environment. Pre-college attributes that he attributes to student's success in college include socio-economic factors such as house-hold income level, educational level of the parents, and parent's occupation (Tinto, 1993). Based on this theory, the disparity between the socio-economic background of White students at EU and African American students at EU is a major contributing factor to the low graduation rate among African American students.

Further, many African American students take fewer credits per semester than their White peers, which is sometimes caused by their financial aid packages and/or the number of work hours logged outside of the classroom necessary to make ends meet. Additionally, many are coming to college campuses with a weaker skill set thereby forcing them to repeat courses at a greater rate than their White peers. This results in African American students not being able to graduate within a four-year period, and more likely to graduate in five, six and seven years (Anonymous, 2006).

A disparity also exists between the educational levels of parents of African Americans and parents of White students. More African American fathers than White fathers achieved a middle school education or less. Further, more White fathers than African American fathers have degrees in higher education. The same is also true for mothers. More African American mothers than White mothers achieved a middle school education or less and more White mothers compared with African American mothers have degrees in higher education. There is a statistically significant relationship between father's education and graduation, which may explain lower graduation rates for African American students based on their lower levels of parental education. However, it is

interesting to note that success in college for White students relates to father's education while this variable is not significant for African American students. Again, the reason most likely rests in the differences between White versus African American family roles and culture.

The data also showed that the families of White students enrolled at EU have higher income levels than the families of African American students enrolled at EU, and since a statistically significant relationship exists between parental income and academic success for African American students, this also appears to contribute to the lower graduation rate for African American students. However this rationale is more speculative given the significance of the income level with graduation is at the $\alpha=.10$ level versus .05 level of confidence.

Another important factor in the low persistence rate among African American students is the students' perceptions of institutional supportiveness (or lack there of). As Allen (1992) and Berger and Milem (1999) found in their studies, supportive college and university environments convey to African American students that it is safe to take risks associated with intellectual growth and development and increase the likelihood that they will succeed. One way of accomplishing this is by forging a collaborative programming partnership between the academic, campus activities, service, and housing and residential life departments to assist African American students to set goals and expectations for involvement levels not only in the in the classroom, but campus-wide activities. This could also include self-empowerment opportunities for the students.

Recommendations for Future Studies

For more than three decades colleges and universities have relied on studies that dealt with post-admission and/or cognitive predictor models of academic success rather than preadmission and non-cognitive predictor models like the model presented in this research. The focus and purpose of this research was to develop a preadmission predictive model of student success for prospective first-time African American college applicants separate from a model for White college-bound students.

Although the study did yield information helpful for identifying White and African American college applicants likely to be academically successful at EU, future research could expand upon the information presented. Specifically future studies might consider incorporating additional non-cognitive predictor variables. It is possible that other preadmission variables would be statistically significant predictors of student success and improve the models' predictive power. Some suggestions for additional variables include extra-curricular activities in high school, attendance in high school, civic engagement activities, participation in athletics, and peer and family support within the high school and the community.

In order to complete a more in-depth study incorporating new variables relevant data must be more accessible for the researcher. A weakness of this current study is that not all data were available for every student. Specifically, parental income and parental education data were not available prior to fall 1995 and fall 1999 respectively. In addition, much of the data were stored disjointedly across different automated systems making retrieval burdensome and difficult. EU and other institutions will need to make an effort to collect and maintain complete data on both non-cognitive and cognitive

preadmission characteristics in order to use them for building stronger predictive models of student success and persistence to graduation.

Graduation was only weakly predicted by the preadmission variables used in this study. This suggests that further research is needed to determine what variables might best predict persistence to graduation by race.

EU and other colleges and universities nation-wide might also benefit from a predictive model similar to the ones presented here applied to first-time Latino college applicants or possibly other minorities. It has been reported, however, that the Latino population is the fastest growing population in the U.S. The Latino population in 2006 reached 44.3 million (U.S. Census Bureau, 2006). Even more compelling is the low number of Latino students who go on to college and complete college degrees. It is reported that Latinos have the worst record of completing college degrees of any race over the past three decades; between 9% and 11% (Jaschik, 2008).

Statistics show that nationally and at EU, a unique disparity between the number of males and females enrolled in higher education exists. The statistics on male and female enrollments are well known. Current figures from the National Center for Educational Statistics (NCES) show that nearly 57% of undergraduate students are female (Weaver-Hightower, 2010). These gaps are projected to grow with women expected to become almost 59% of undergraduates by 2018 (Weaver-Hightower, 2010). As the gap widens further research into predictive models for males and females will become more warranted. To complicate matters, African American and Latino males are much less likely to have a post-secondary degree than both their White and Asian American peers and females of color (Weaver-Hightower, 2010). Beyond enrollment, the

academic achievement of males is of even greater concern. Weaver-Hightower (2010) reported that women are obtaining better grades than men and are more likely to develop aspirations for graduate and professional degrees. Ultimately, women achieve advanced degrees at a higher rate than men

Challenges facing young males as they pursue post-secondary education and as they attempt to succeed in higher education validate the need for further research.

Drawing a focus on the retention and graduation of male students, that program developers at high schools and colleges and universities may build upon, will increase male participation in post-secondary education and improve student success rates after entry into colleges and universities.

Additionally, colleges and universities should focus further research on the effects of financial aid and the accessibility to financial aid on student success. In this study parental income was determined statistically significant for predicting collegiate GPA of African American students. As efforts are made to eliminate barriers and increase access to various avenues of financial aid, this result may no longer remain as strong since it seems feasible that increased access to financial aid may counteract or minimize the effects of low parental income on collegiate GPA.

Although EU continues to be successful with its retention and graduation rates of White students, it has been dissatisfied with its retention and graduation rates of its African American students and recently has become dissatisfied with results for Latino students. As shown in Table 22 below, in 2007 EU's graduation rates for White students were above the national average while the rates for Latino students were below average.

Table 22

Comparison of EU Graduation Rates vs. All Public Masters I & II (2007)

Race	EU			All Public Masters I & II		
	4 Year(%)	5 Year(%)	6 Year(%)	4 Year(%)	5 Year(%)	6 Year (%)
Latino	5.0	27.9	35.3	11.1	28.0	38.5
African American	17.5	32.5	28.2	13.5	29.3	36.2
White	39.4	62.8	70.7	24.4	44.0	49.6

Source: CSRDE (2006-2007), Office of Institutional Research (2007). Facts book, Millersville University

These and other challenges faced by the Latino student population as they pursue post-secondary education validate the need for further research in this area.

Conclusions

Student retention remains an issue of major importance to colleges and universities nation-wide as evidenced by the enormous amount of research that has been devoted to this topic. Many of the reasons for this attention were discussed in the literature review. One notable reason for a continued focus in this area over the past decade is that colleges and universities have been asked to demonstrate that they deliver a measurable, empirical product or outcome. In many instances, such assessment initiatives have resulted in a direct connection between the performance of colleges and universities and the funding they receive. The concept of performance-based funding has gained widespread support, and has become ever more popular with state legislators, governors and accrediting associations as a means of rewarding agencies and institutions for good practice and punishing those for inefficiencies and waste.

Most individuals recognize a legitimate need for accountability and realize that the fiscal and societal pressures to improve educational performance are likely to

continue into the future. When evaluating institutional performance, some facets of the higher education process lend themselves more easily to this practice than others. One of the more common variables and most pressing problems in higher education is the success and graduation of students. With the threat of under-enrollment and an increase in attrition at our colleges and universities, student retention has become a priority for administrators on most campuses, and academic success relates directly to this concern.

From a more collective point of view, an abundant amount of research has shown that the portion of students who graduate from college, regardless of their race, plays a major role in our nation's economic competitiveness. In order to assure student success at EU and other institutions nation-wide, institutions should review the enrollment management plans that they have in place. As part of their strategies, institutions should review their recruitment plan for new markets and new modalities, and work to identify students of color who are academically strong or have the potential for academic success. In their pursuit college admissions offices should consider using different variables for White and African American students when predicting their academic success and graduation. In addition to cognitive preadmission data, admissions offices should collect and incorporate non-cognitive in their models.

In order to recruit an academically prepared freshmen class, institutions should begin to develop or expand upon pre-college programs for students of color (e.g. GEAR UP, Upward Bound, Talent Search and Dual Enrollment programs). Additionally, as typical high school ranks seem to run counter to intuitive expectations, EU and other institutions might consider looking at developing a pipeline for students of color. A pipeline for students of color provides exposure to the university for the students at an

early age. Workshops and summer camps also provide not only the opportunity of strengthening students' math and English skills necessary for academic success, but also reinforce the importance of higher education. Programs such as these also strengthen parental awareness and involvement in their child's academic achievement. These approaches will probably affect the predictor variables and should be studied.

Many factors seem to influence retention and graduation and preadmission variables alone can't strongly predict such an outcome. Retention is a much more complex issue than academic success alone as measured by collegiate GPA. Once students are recruited and enrolled, EU and other institutions should work with Academic Affairs, Student Affairs and other departments on campus to create a campus-wide comprehensive retention plan to engage students as entering freshmen and throughout their academic experience at the institution. The retention plan should have a component similar to this research which will target those students deemed "at-risk" by the institution. The predictor variables identified in this study could be used to help identify "at-risk" students. Retention plans should include an intrusive advisement team that is trained at working with these students so they are less likely to drop out.

There is a cultural uniqueness associated with African American students that EU and other colleges and universities might wish to consider addressing. This is evidenced by the fact that different predictor variables were significant predictors of academic success for African American students in comparison to the White students in this study. Specifically, SAT scores were determined a significant predictor for African American students but not for White students. For this reason, more research including in-depth exit interviews upon graduation or withdrawal and other forms of investigation into the

experiences of those who have succeeded (surveys, focus groups, etc) could provide a deeper understanding of the unique factors that affect African American student academic success and graduation.

Additionally, EU and other institutions should work at creating a welcoming, safe and engaging campus. Tinto (1975) who is considered an early pioneer in student persistence research has pointed to student integration and institutional commitment as two of the primary predictors of academic success at colleges and universities. For incoming freshmen, some initiatives that are used nation-wide and gaining in popularity are Freshmen Year Experiences, Living Learning Communities and Academic Early Warning Systems. These initiatives all work to ensure freshmen academic success and retention of all students regardless of race.

The findings presented in this study will assist EU and other institutions with recruiting and retaining African American students. The findings should contribute to the understanding of the predictors of academic success that were present over this ten-year period at EU and will continue to be predictors of student success for both African American and White students. EU can build on these findings and work toward closing the academic achievement gap that is present between these two groups as they relate to four, five and six year graduation rates.

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